

## **Appendix D:**

### **15-Day Comment Letters**

Comments received during the 15-day comment period,  
February 3, 2017 – February 21, 2017



# CITY OF CULVER CITY

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OG-F-1-CC

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MEGHAN SAHLI-WELLS  
THOMAS AUJERO SMALL

February 17, 2017

Elizabeth Scheehle  
Branch Chief, Oil and Gas and GHG Mitigation Branch  
California Air Resources Board  
1001 "I" Street  
Sacramento, CA, 95814

**Subject: Revised Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities**

Dear Ms. Scheehle:

The City of Culver City supports reasonable environmental regulations aimed at enhancing air quality. We seek to improve air quality in Culver City and the surrounding areas, and we want to ensure that air quality and public health are protected during oil and gas drilling. As such, the City of Culver City strongly supports the proposed rule to regulate greenhouse gas emissions from oil and gas facilities in California. We would like to thank the California Air Resources Board staff for being a national leader in promoting clean air. We especially value the provisions that:

- Require a quarterly baseline inspection requirement (without a step-down).
- Specify the use of continuous ambient air quality monitoring along the fencelines of natural gas storage facilities.
- Prioritize natural gas capture over combustion requirements.

These policies will result in the detection of more leaks, better maintenance, cleaner air, and improved public health.

We urge you to hasten the timeframe for adopting and implementing the rule. In this draft, implementation is delayed at least a year from when it was initially proposed. Clean air cannot wait. We also urge you to create a detailed plan for the CARB and local air pollution districts to implement the new regulations, including periodic audits of newly regulated facilities. With these improvements, CARB will ensure California remains a world leader in the protection of clean air and the reduction of greenhouse gas emissions.

If you have any questions, or wish to discuss this further, please contact Jesse Mays, Assistant to the City Manager, at (310) 253-6009.

Sincerely,

Jim B. Clarke  
Mayor

cc: The Honorable Members of the City Council  
John M. Nachbar, City Manager

February 17, 2017

Clerk of the Board  
California Air Resources Board  
1001 I Street  
Sacramento, California 95814

### **Kairos Aerospace Comments on the Modified Text for the Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities**

We at Kairos Aerospace commend the ARB on its commitment to curb methane emissions from the oil and gas industry. The proposed regulation is one of the strongest, with the broadest applicability, in the nation. We would, however, respectfully recommend a modification to the rule that would achieve similar methane reductions at a lower cost to the regulated industry. We focus our comments on LDAR for fugitive methane emissions.

The fugitive methane emissions detection technology landscape is highly dynamic, with innovation happening in real time. Innovation in technology invariably leads to better outcomes at lower costs. However, the current draft is prescriptive in terms of LDAR technology, sacrificing the opportunity for commercialization of new technologies that could both improve overall environmental outcomes and lower costs. The inflexible nature of the LDAR regulation also impacts different operators differently, as significant variations can exist in operators' facilities, emissions, and costs of control.

ARB should allow operators to seek approval to allow alternative compliance pathways, as long as the alternative is at least as effective in reducing methane emissions volume as quarterly OGI-based LDAR. ARB should also establish clear criteria by which the equivalence of alternative programs will be judged, and ensure that the approval process is transparent and open to public participation. Only by allowing space for new and innovative technologies can ARB ensure that it is achieving its goal of maximum environmental impact at minimal cost.

F-2-1

### **Many Options Exist, and More Are in Development**

As ARB knows, there is already a wide range of proven technologies and implementations on the market, with different detection limits, frequencies, and underlying science. ARB has undertaken projects with a variety of instruments – identifying methane hot-spots, implementing a tiered methane observation system, using aerial surveys for Aliso Canyon-related monitoring.<sup>1,2</sup> ARB recently posted a research report, “Enhanced Inspection & Maintenance for GHG and VOCs at Upstream Facilities,”<sup>3</sup> that evaluates the effectiveness of six different instruments and finds the three remote sensing instruments (RMLD, IR camera, and Picarro Surveyor) to be similar in their

<sup>1</sup> “California Methane Monitoring for Climate Action and Public Safety,” presented by Riley Duren. June 2016. [https://www.arb.ca.gov/cc/oil-gas/Miller\\_2016-06-14%20-%20Duren\\_methane\\_hot\\_spots.pdf](https://www.arb.ca.gov/cc/oil-gas/Miller_2016-06-14%20-%20Duren_methane_hot_spots.pdf)

<sup>2</sup> “Airborne Estimation of Surface Emissions,” presented by Stephen Conley. June 2016. [https://www.arb.ca.gov/cc/oil-gas/Conley\\_Presentation\\_ARB%20%281%29.pdf](https://www.arb.ca.gov/cc/oil-gas/Conley_Presentation_ARB%20%281%29.pdf)

<sup>3</sup> “Air Resources Board RFP No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised),” prepared by Sage ATC Environmental Consulting LLC for the California Air Resources Board. December 2016. [https://www.arb.ca.gov/cc/oil-gas/sage\\_i&m\\_ghg\\_voc\\_dec2016.pdf](https://www.arb.ca.gov/cc/oil-gas/sage_i&m_ghg_voc_dec2016.pdf)

ability to detect emissions. ARB is also a part of the ITRC's Evaluation of Innovative Methane Detection Technologies team, which is working to evaluate and compare different technologies, and has participated in several workshops and conferences discussing ways to address fugitive methane emissions. These efforts indicate to us that ARB is aware of the plethora of options, and the ways they can be combined to yield better and more cost-effective results, yet the regulation itself does not reflect this understanding.

In addition to these existing options, there are several innovative technologies at different points along the spectrum from concept to commercialization. These options all have a different set of monitoring frequencies and technical capabilities. On one end of the spectrum there are technologies still in development, for example in ARPA-E's MONITOR program and EDF's Methane Detectors Challenge. On the other end, for example, there is Kairos Aerospace, which has patented and newly commercialized an aerial-based methane imaging system called LeakSurveyor that leads to greater methane reduction at a lower cost than the OGI required by the current draft regulation. Our system allows operators to conduct low-cost, high-frequency surveys of their fields to find and fix large emitters faster. We image methane in false color from fixed-wing aircraft, similar to NASA JPL's AVIRIS system, combined with simultaneous optical imagery, to produce georeferenced optical maps with methane plumes pinpointed and sized. Once we screen a large area and identify the emission sources, targeted ground crews follow up to identify and repair the specific component that is leaking. This approach results in a lower overall cost to operators, as compared to sending ground crews to every site. And more frequent surveys for large leaks result in a greater environmental impact than infrequent ground surveys.

It is, of course, critical that any alternative LDAR program achieves at least the same environmental impact as the LDAR program laid out in the regulation. Comparing different LDAR programs is possible through computer models, combined with real-world demonstrations.

### **Equivalent Environmental Impact is the Important Thing**

At a basic level, the emission control effectiveness of any LDAR program is a function of both the ability of the technology used to detect leaks and the frequency of monitoring. An equivalent program may require more frequent monitoring, if its mass rate threshold for detecting leaks is higher, because higher mass emissions reductions from large leaks found earlier are offset to some degree by smaller leaks which go undetected. Indeed, this is reasoning put forth by the EPA in 2006 in a proposed amendment to allow OGI as an alternative work practice to Method 21,<sup>4</sup> and extends easily to a range of monitoring instruments. This reasoning is also used in a 2004 American Petroleum Institute report<sup>5</sup>, which states:

“Lower leak definitions for repair do not necessarily lead to better emissions control since, as the leak level is decreased, few additional leaking components are added to the repair group and these contribute very little to the overall mass emissions. The Smart LDAR

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<sup>4</sup> EPA Alternative Work Practice to Detect Leaks from Equipment, 71 FR 17401 (April 6, 2006) (to be codified at 40 CFR 60).

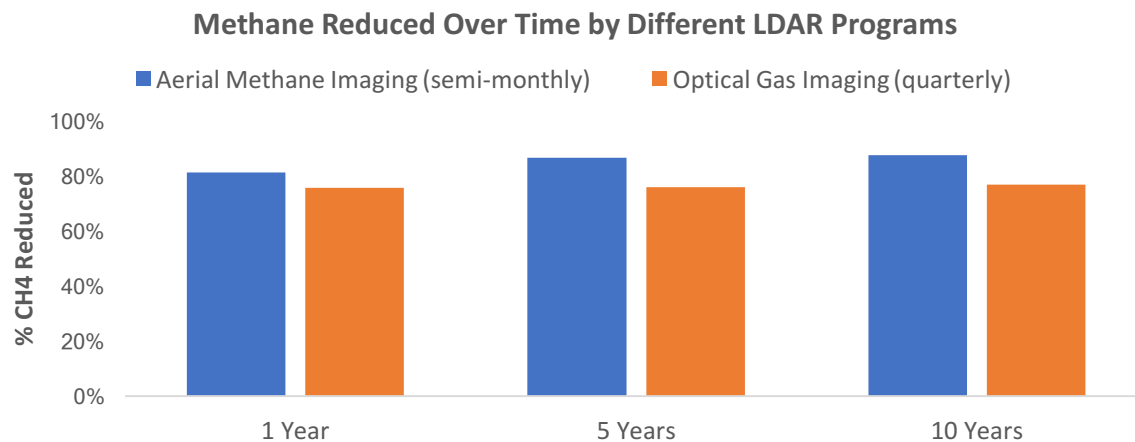
<sup>5</sup> “Smart Leak Detection and Repair for Control of Fugitive Emissions,” prepared by ICF International for American Petroleum Institute. June 2004.



approach...focuses on identifying and repairing the highest leakers since these are the source of almost all the mass emissions. Equivalence is obtained by more quickly finding and repairing these large leaks, which more than offsets the emission rates from components with low ppmv readings that leak for longer periods. The use of optical imaging could provide a more cost effective approach to more quickly find the high leakers.”

Using a computer model (along with laboratory testing and field validation of instruments) solves many of the real-world difficulties of comparing the equivalency of different technologies in the field over time. This approach was also supported by the EPA in its 2006 amendment mentioned above, and the API in its 2004 report, indicating broad stakeholder agreement on its usefulness and validity. It is therefore also the approach we at Kairos use to arrive at our emissions reduction estimates. We use an open-source model called the Fugitive Emissions Abatement Simulation Testbed (or FEAST).<sup>6</sup> This model simulates natural gas leakage over time under different LDAR programs. We used a power-law distribution<sup>7</sup> fitted to the 2011 Fort Worth Air Quality Survey<sup>8</sup> data to generate the leaks from the gas field. We then modeled the average reduction (relative to a null scenario) in methane emissions with quarterly Optical Gas Imaging surveys and semi-monthly Aerial Methane Imaging surveys (which in this case is Kairos Aerospace’s LeakSurveyor technology with a minimum detection limit of 120 g/hr or 500 ppm-m).

We find that semi-monthly LeakSurveyor surveys result in 87% reduction of methane emitted and quarterly OGI surveys result in 76% reduction over a null scenario<sup>9</sup> over five years.



<sup>6</sup> FEAST Documentation:

[https://pangea.stanford.edu/researchgroups/eao/sites/default/files/FEASTDocumentation\\_0.pdf](https://pangea.stanford.edu/researchgroups/eao/sites/default/files/FEASTDocumentation_0.pdf)

<sup>7</sup> See Appendix B.

<sup>8</sup> City of Fort Worth Natural Gas Air Quality Study. Eastern Research Group et al. for the City of Fort Worth, 2011. URL: [http://fortworthtexas.gov/uploadedFiles/Gas\\_Wells/AirQualityStudy\\_final.pdf](http://fortworthtexas.gov/uploadedFiles/Gas_Wells/AirQualityStudy_final.pdf)

<sup>9</sup> The null scenario is modeled as operators randomly noticing and fixing leaks in the normal course of operations, with no explicit LDAR program.



Therefore, LeakSurveyor would be a more effective LDAR program than OGI, which is an approved technology in the current regulatory draft. (See Appendix A for more detail on LeakSurveyor’s capabilities, and Appendix B for more detail on FEAST.) Incidentally, the LeakSurveyor program is also cheaper than the OGI program, despite the increased frequency of surveys, since each LeakSurveyor survey is an order of magnitude less expensive than a conventional OGI survey. LeakSurveyor also offers leak rate quantification, direct imaging and georeferenced results, and an auditable record of surveys and results.

The same FEAST model can be used to compare other technologies as well, by adding new modules to the program. Thus an operator can choose the most cost-effective LDAR program based on their own needs and constraints, and ARB can estimate whether the proposed alternative compliance program will reduce emissions from an operator at least as much as quarterly OGI, ultimately resulting in more efficient regulation.

### **Conclusion**

In LDAR, the current ARB draft actually falls behind EPA’s NSPS OOOOa regulations, where instead it should be an opportunity for ARB to lead the EPA. California is home to Silicon Valley innovation and a long-time leader in air quality regulation, yet these rules do not leave space for innovation. NSPS OOOOa allows an alternative compliance pathway for LDAR of new or modified well sites and compressor stations, but the lack of criteria for judging equivalence is unclear and has led to confusion from many operators, and the demonstration period is prohibitively long and costly. ARB’s oil and gas regulation applies to both new and existing sources, making LDAR even more cost prohibitive to operators, yet does not include an alternative compliance pathway option.

We strongly urge the agency to adopt an alternative compliance pathway that is robust, minimally prescriptive, and specifically creates an entry point for demonstrated methane detecting solutions. Such an approach will help catalyze a race to the top in technology, reduce costs for the regulated community, and boost environmental outcomes.

We greatly appreciate the opportunity to be part of the dialogue on GHG standards in California, and look forward to working with ARB and industry toward our common goals. We are happy to answer questions or discuss anything in these comments in greater detail.

Steven Deiker, Chief Executive Officer  
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Mountain View, CA 94040

F-2-2

## **Appendix A: LeakSurveyor (Aerial Methane Imaging)**

LeakSurveyor is a new methane detection service that combines an aerial methane detection instrument with a proprietary data analysis pipeline. Our goal is to provide customers with clear, actionable information about where, and how big, their methane emissions are. LeakSurveyor is designed to survey large areas frequently at an affordable cost – a single instrument can cover 30,000 acres in one day. Once an emission is detected aerially, the customer sends a directed ground crew to identify and repair the particular component that is leaking. This hybrid approach – frequent aerial surveys combined with targeted follow-up inspections – saves a company time and money, and saves more methane than sending ground crews to every site. This is because:

- 1) Sources are often remote and most are not emitting significant amounts of methane, so sending crews to each one wastes the time of engineers at a meaningful cost.
- 2) Finding a single large emission a day earlier can be more impactful than finding hundreds of small emissions, so time is best spent looking for the large emissions.
- 3) We can frequently survey unsafe- or difficult-to-monitor components that would otherwise rarely be surveyed, and recover gas that would otherwise go undetected by ground-based monitoring methods for long periods of time.

Ultimately, LeakSurveyor stops the large emitters that cause most of the environmental and economic damage earlier, for a greater cumulative impact.

### **Highly Specific Methane Imaging**

The LeakSurveyor instrument consists of three parts: 1) an optical camera for visual verification of sites, 2) a GPS and inertial monitoring unit to record precise positions, and 3) a patented spectrometer that detects methane. The spectrometer is sensitive to infrared sunlight that reflects off the ground. When this light passes through a plume of methane, the methane absorbs certain frequencies and lets others pass through. The spectrometer identifies those absorption features, and associates them with a particular position on the ground. This makes our system highly specific for methane, as it is the only molecule that leaves this particular signature on the spectrum, and avoids signal confusion from other gases like propane. It is also specific to location; the resolution on the ground (~20 feet) is well-matched to most gas plumes. As a result, we produce direct images of plumes, overlaid on simultaneously captured optical imagery. After reviewing the specifications and capabilities of other categories of methane sensing technologies we believe LeakSurveyor belongs to a new class of instrument, which we have been calling “Aerial Methane Imagery.”

LeakSurveyor’s resolution allows us to distinguish between separate point sources of methane and differentiates us from air-sampling techniques. In the image below, for example, we separate the methane plume from natural gas production from the methane plume from the flooded rice field nearby, and would only report the former. What’s more, we distinguish between the location and concentration of separate emissions within a single site, such that the ground crew following up on the emissions can go directly to a specific area to identify and repair a specific component.

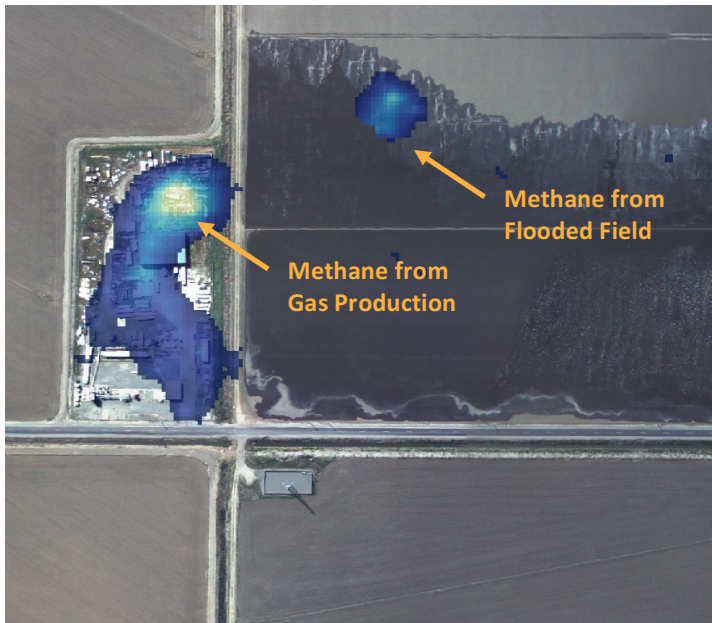


Figure 1: LeakSurveyor's direct point source methane imaging separates the gas production-related emission (on the left) from the nearby flooded field-related emission (on the right). This allows distinct attribution of methane between different sources.

### **Clear, Actionable, Prioritized Results**

The image below is an example of the results we provide. Methane plumes, highlighted in blue, are overlaid on optical imagery of a survey area about a mile wide with ten separate well pads.



Figure 2: Sample LeakSurveyor false color image; blue areas represent methane plumes.



The minimum detection threshold for LeakSurveyor in controlled settings is 500 ppm-m. With a 5 mph wind, this corresponds to an emission rate of 10 Mscf/day (that is, 8 kg/hr, or 2 g/s.) Our conservative real-world detection limit is 2500 ppm-m, which corresponds to an emission rate of 50 Mscf/day. In the real world, LeakSurveyor detects a statistical fraction of emissions below 50 Mscf/day. As we continue to collect vast quantities of data – we have recently set up partnerships to do so with a number of operators, non-profits, and government agencies – we will continue to refine the “probability of detection” curve we have built that shows the probability of detecting emissions as a function of the emission rate and of external conditions like weather and terrain.

LeakSurveyor distinguishes between different sizes of methane emissions with a precision within  $\pm 25\%$ ; in Figure 4 above, areas of dark blue represent lower concentrations, ranging towards lighter areas which represent higher concentrations. Our ability to identify, over a wide area, the size of emissions allows prioritization of repair work to stop the biggest emissions fastest for greater impact on the environment, and improves on the quality of data on which academic research and policy decisions are currently based. Figure 3 below shows a controlled methane release where we simultaneously operated LeakSurveyor from an airplane flying at 3,000 ft., a FLIR GasFinder 320 IR camera pointed at the release valve from 50 ft. away, and a Method 21 analyzer held 20 ft. from the valve. The LeakSurveyor results show a clear relationship between the methane release size and our signal size. As with our minimum detection threshold, we continue to refine our quantification ability as we collect more LeakSurveyor data combined with ground truth measurements. We also continue to conduct calibration studies with controlled releases, often flying a controlled release at the same time as we are flying operators’ fields.

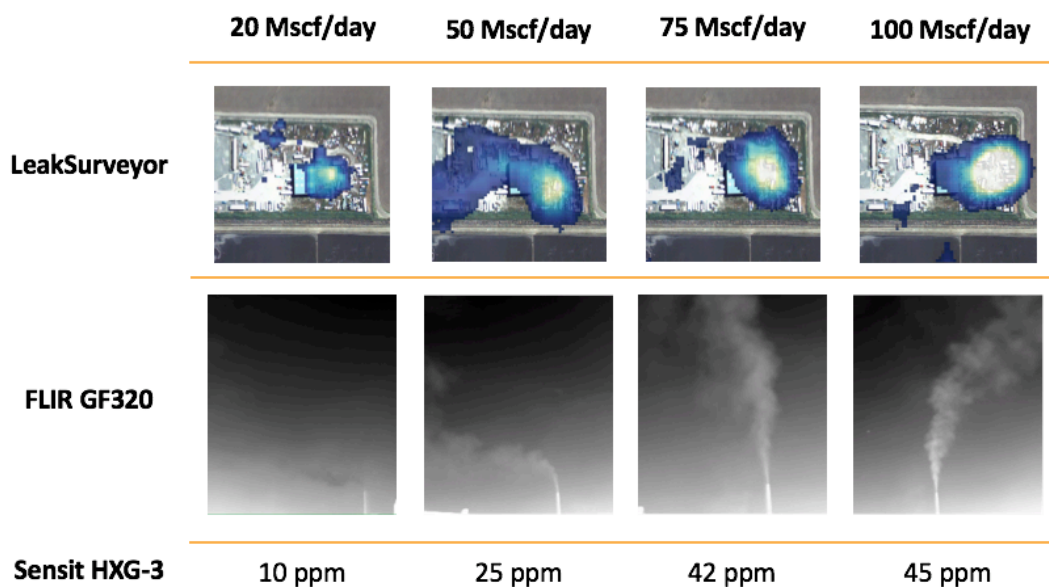


Figure 3: Side-by-side comparison of emissions monitoring technology results during a controlled methane release. LeakSurveyor is able to distinguish between different leak sizes.

## Faster, Cheaper, Safer

The LeakSurveyor instrument is easily mounted on light aircraft and flown at standard general aviation altitudes of 3,000 ft., making it orders of magnitude faster than a ground crew and able to access terrain that would be difficult or dangerous to reach by car. LeakSurveyor is also faster and safer than helicopters. It can fly longer and farther than commercially available drones, which rarely have battery lives of more than 30 minutes, limiting their flight range and increasing their cost. Drones are also subject to complex and shifting state-by-state regulatory issues.

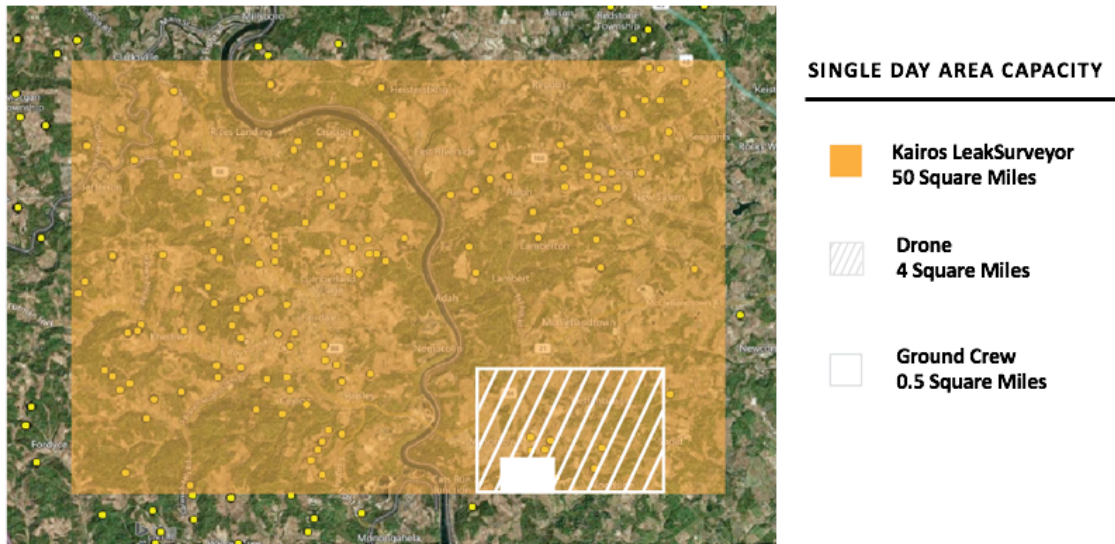


Figure 4: LeakSurveyor covers orders of magnitude more area than a ground crew, allowing frequent revisits.

## Plug and Play Service

We operate the pod as a service, so there is no training, calibration, or instrument maintenance or repairs needed on the part of our customers. We eliminate the possibility of operator error or variation, as all protocols, from pre-survey calibration to post-survey data quality assurance, are performed by highly trained Kairos engineers or automatically through our cloud-based data pipeline. Results are thus directly comparable from flight to flight. Each pod attaches to a plane with no tools, wiring, or modifications required (see image below), which means we do not need FAA approval.



Figure 5: Pod attaches to the wing strut of light aircraft with no tools, modifications, or wiring connections.

### **Unique Software Capability, Continuous Improvement**

Our proprietary software and data analysis capabilities are unique in the market. Our modern “big data” analytics pipeline immediately, automatically, and uniformly processes the data we collect into usable form – whether that form is an individual report that integrates with existing infrastructure management software used by operators, or a mainstream tool like Google Earth. Our process reduces the possibility of user error in interpreting results, lowers compliance costs, and increases reporting accuracy. An additional benefit is that the accuracy and correctness of each new survey will be improved by the overall analysis of all the data we have ever collected, as results taken over time are used as a feedback loop to improve the LeakSurveyor service.

### **No Capital Expenditures on Equipment or Training**

Because we operate LeakSurveyor as a service, there are no upfront expenditures on capital (e.g. instruments or trucks) or labor (e.g. training or hiring). This means that starting up an LDAR program can yield savings for a company immediately. It also gives companies flexibility in crafting an LDAR program that works for their particular needs. For example, a company that uses an IR camera for one area may want to use LeakSurveyor to monitor another hard-to-reach area. A company that has only enough labor capacity to conduct semiannual surveys can increase its monitoring frequency to quarterly or even monthly with LeakSurveyor.

### **Lower Cost Per Survey Than Alternatives**

LeakSurveyor also reduces costs per survey because we have greatly reduced the need for on-the-ground surveyors, the most significant cost in a traditional program, whether an operator conducts his own surveys or hires a third party. As a quick back-of-the-envelope comparison, Carbon Limits<sup>10</sup> estimated that it costs \$600 to hire a contractor to survey a single well site, whereas LeakSurveyor costs \$100 per well site. Realistically, most of the operators we have spoken to report that an IR camera contractor costs more than \$600 per well site, particularly as the companies still need to send in-house engineers to accompany the contractors on-site; anecdotally, the cost has also increased due to increased demand and a shortage of both OGI cameras and qualified contractors. We have also run cost analyses using assumptions from other sources, for various sizes of producer and for other monitoring options (i.e. owning an IR camera versus hiring a contractor, using a Method 21 analyzer instead of an OGI).

### **Simplification of Reporting and Recordkeeping**

In addition to no upfront costs and low ongoing costs, our post-survey costs are lower as well – our software and secure data pipeline streamlines necessary activities like recordkeeping and reporting for compliance purposes, as well as more in-depth analysis. We generate automatic reports regarding data quality and completeness during each survey and for the entirety of the survey. All of our raw data and metadata is stored in the cloud indefinitely for recordkeeping and time-series analyses for operators. And our automated survey greatly reduces the time it takes to record component locations and IDs for any fugitive emissions detected.

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<sup>10</sup> “Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras,” Carbon Limits SA. March 2014. URL: [http://www.catf.us/resources/publications/files/Carbon\\_Limits\\_LDAR.pdf](http://www.catf.us/resources/publications/files/Carbon_Limits_LDAR.pdf)

## Appendix B: FEAST, the Fugitive Emissions Abatement Simulation Testbed

For an in-depth description of the FEAST model, please see the documentation online at [https://pangea.stanford.edu/researchgroups/eao/sites/default/files/FEASTDocumentation\\_0.pdf](https://pangea.stanford.edu/researchgroups/eao/sites/default/files/FEASTDocumentation_0.pdf). This appendix is meant to serve as a basic summary of the model's structure and how we used it to model the efficacy of different LDAR programs.

As described in the documentation: "FEAST simulates the leakage from a natural gas field as a function of time under different LDAR programs. It defines an LDAR program as a technology used for leak detection, the implementation of the detection technology, and the leak repair process. Based on a plume simulation, FEAST applies detection criteria for several LDAR methods, identifies the leaks that will be detected under each LDAR program, and removes them from the set of leaks at the appropriate time. The total gas saved by the LDAR program is calculated as the time-integrated difference between the leakage in a null scenario and a scenario with the applied LDAR program. The null scenario represents the status quo: it allows a steady leakage rate through time as new leaks are produced and old leaks are repaired randomly without an explicit LDAR program."

The input data for FEAST include field parameters (number of wells, number of components per well, average distance between wells), a dataset of leak rates, atmosphere data in order to simulate the gas plumes (measured wind speeds and directions), and LDAR parameters (detection criteria, time to find leaks).

**Leak distribution:** The FWAQS study sampled 375 well sites one time, which represents a relatively small sample size unlikely to capture the full range of extreme results. In order to account for super-emitters, we extended the FWAQS data with a power law distribution, which is usually used to model data whose frequency of an event varies as a power of some attribute of that event – in this case the event is a leak and the attribute is leak size. The power law distribution we used has an upper bound of 500 Mscf/day (meaning the simulation never generates a leak larger than that.) We chose -1.75 for the power, or exponent, in the power law formula  $y = ax^k$ , to match the national top-down estimates of petroleum-sector methane emissions. If the exponent is more negative, excessive numbers of tiny leaks are required to produce the methane from the top-down estimates. This results in many more leaks than wells, such that the typical well would have three to five leaks. This is out of sync with reality, as many wells and facilities are not leaking at all. If the exponent is less negative (closer to zero), then more of the methane comes from truly enormous emissions. We don't have enough data to support that, although it could still be true.

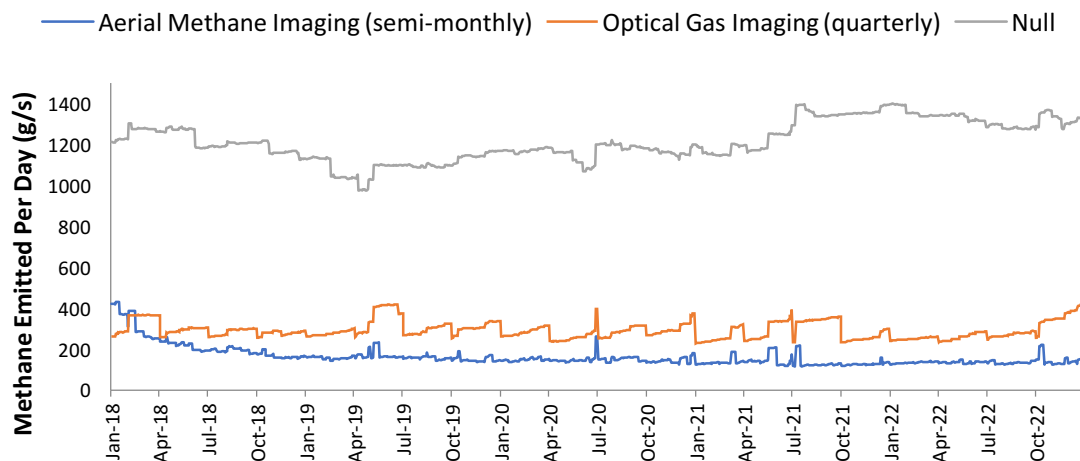
**LeakSurveyor:** We added a module for LeakSurveyor, which is an implementation of a method we have termed Aerial Methane Imaging. We formed our expectations for performance based on extensive calibration tests, both in a controlled setting – where a controlled methane release was gradually turned up while a LeakSurveyor plane flew back and forth overhead and an IR camera operator and a Method 21 instrument operator stood on the ground and recorded images and readings for comparison – and in the real world, where we collected results for an operator and then performed ground truth measurements to validate our field results. This real-



world performance was then added to the FEAST simulation with the consultation of one of the original authors of the code to ensure correct integration.

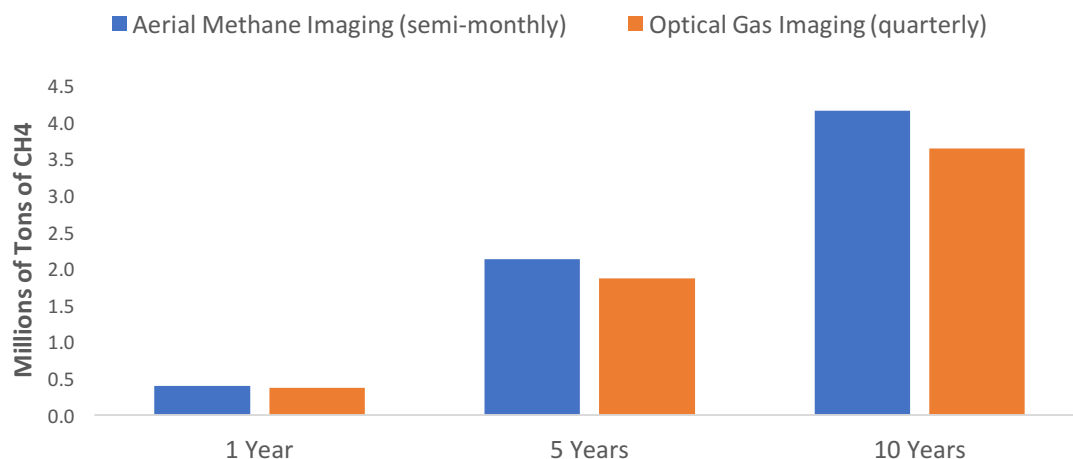
The chart below shows one simulation of the FEAST model over five years (labeled as January 2018-December 2022.) The blue line represents total emissions from the 1,100 wells in the natural gas field with a semi-monthly Aerial Methane Imaging program, which in this case is LeakSurveyor. The red line represents total emissions from the natural gas field with a quarterly OGI program. The grey line represents total emissions from the field in the null case, where leaks are randomly fixed in the normal course of operations. Over the time represented, the LeakSurveyor program reduces methane from the null scenario by 87%, and OGI reduces methane by 76%.

### Gas Field Emissions With Different Control Techniques



The chart below shows the cumulative volume of methane reduced over time relative to the null scenario.

### Methane Reduced Over Time by Different LDAR Programs





***California Independent Petroleum Association***

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*Sacramento, CA 95814*

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*Fax: (916) 447-1144*

Comments of the California Independent Petroleum Association  
on Attachment 1 – Proposed Regulatory Order for the  
Proposed Greenhouse Gas Emission  
Standards for Crude Oil and Natural Gas Facilities

Clerk of the Board  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

February 21, 2017

*Via electronic submittal to:* [https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=oilandgas2016&comm\\_period=1](https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=oilandgas2016&comm_period=1)

The California Independent Petroleum Association (CIPA) appreciates the efforts staff has made to understand the technical and policy issues surrounding this rulemaking. CIPA submits the following comments for your consideration.

The mission of CIPA is to promote greater understanding and awareness of the unique nature of California's independent oil and natural gas producer and the market place in which he or she operates; highlight the economic contributions made by California independents to local, state and national economies; foster the efficient utilization of California's petroleum resources; promote a balanced approach to resource development and environmental protection and improve business conditions for members of our industry.

CIPA has been working diligently with its members to provide technically-sound, constructive feedback on the proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas (Regulation). The following represents our continuing effort to provide targeted input in an attempt to improve implementation of the regulation consistent with our members' interests and the overarching goals of the Air Resources Board (ARB).

CIPA understands the goals of the Regulation, but believes that providing operator flexibility will allow the GHG reductions sought by ARB to be achieved, but at a much lower cost than an overly specific regulation. F-3-1

***Implementation Issues***

CIPA would support flexibility in implementation of the rule that also achieves ARB's compliance goals. Therefore, there are a few clarifications that ARB can provide within either the Final Statement of Reason, the adopting Resolution or in the ARB/Air District Memorandum of Agreement (MOA).

1. CIPA requests clarity that “petroleum waste product”, is indeed not a direct byproduct of production or separator operation, but rather some other non-production fluid from equipment such as waste hydraulic fluid. F-3-2
2. CIPA requests clarification that the first year reporting is not due until July 2019, and that it would be for all of 2018 but not any of 2017. F-3-3
3. CIPA request clarification of Section 95669(o)(5) that if all leaks are fixed within the timeframes provided within the rule that “shall not constitute a violation...in this subarticle”, and that the reference to the 4<sup>th</sup> quarter is limited to the number of leaks in any given year. F-3-4
4. The stakeholder process, timing and uniformity of the ARB/District MOA process is still unclear to CIPA. We would request that prior to the final rule adoption, that these MOAs be made public with adequate time for stakeholder review and comment. F-3-5
5. CIPA requests clarity on the new LDAR exemption in Section 95669(b)(12)—“Components found on steam injection wells or water flood wells.” The term “water flood wells” is not clearly defined as both water injection wells and oil production wells that are part of a water flood project could be considered “water flood wells”. Is the intent for this exemption to be for water injection wells, which include water disposal wells? F-3-6
6. ARB has clarified what is meant by “per day” in parts of the rule, but in some of the various calculations of annual emissions and in some reporting forms it is still undefined. CIPA suggests that for clarity and consistency it should be made clear that what is meant is the total annual throughput for the prior calendar year divided by 365 days. F-3-7

## ***Conclusion***

This rulemaking process has been extensive. CIPA understands the state’s desire to reduce methane and GHG emissions, but points out that this “direct command and control” regulation is in addition to the carbon price signal and incentive to reduce emissions that comes from the Cap-and-Trade Regulation. These duplicating regulations add cost and inefficiency to the market policy that is the cornerstone of California’s GHG reduction efforts.

We hope to keep the lines of communication open on these very important issues as this rule goes from adoption to implementation. Please reach out to CIPA should you have any questions or would like to discuss further.

Sincerely,

/s/

Rock Zierman  
Chief Executive Officer  
California Independent Petroleum Association



February 21, 2017

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Oil and Gas and Greenhouse Gas Mitigation Branch  
California Air Resources Board  
1001 "I" St. Sacramento, CA, 95814

Joseph Fischer  
Air Resources Engineer  
California Air Resources Board  
1001 "I" St. Sacramento, CA, 95814

VIA Electronic Mail

**Re: Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities Modified Text and Availability of Additional Documents and/or Information**

Dear Ms. Scheehle and Mr. Fischer:

Thank you for accepting these comments submitted by Environmental Defense Fund ("EDF") on the February 3, 2017 proposal to regulate greenhouse gas emissions from oil and gas facilities. This proposal responds to the Air Resources Board ("ARB") direction to the Executive Officer to consider whether any additional conforming modifications were necessary to the June 1, 2016 proposal. EDF is a national membership organization with over two million members residing throughout the United States, nearly 70,000 of which live and work in California and who are deeply concerned about the pollution emitted from oil and natural gas sources.

EDF supports the modifications to the June 1, 2016 proposal reflected in the current version of the proposed rule.<sup>1</sup> In particular, we strongly support the quarterly inspection requirement in Section 95669(g). As our prior comments demonstrated, frequent, if not continuous, inspections of oil and gas facilities for leaks is essential to ensuring maximum reductions of harmful natural gas emissions.<sup>2</sup>

I. Quarterly Inspections Are Highly Cost Effective, As a Recent ICF Analysis Demonstrates

<sup>1</sup> Attachment 1: Proposed 15-Day Modifications, available at <https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasatt1.pdf>.

<sup>2</sup> See Feb. 19, 2016 group comments submitted by CATF and May 15, 2015 EDF comments.

CARB's revised cost estimates demonstrate that quarterly Method 21 inspections are highly cost effective. CARB estimates the cost of its proposal to be \$23 per Metric Ton of Carbon Dioxide Equivalent reduced (assuming a 20 year global warming potential and savings from recovered gas).<sup>3</sup> CARB's analysis includes costs associated with inspecting idle wells, well casing vents, and compressors as well as traditional "components" such as valves and flanges, per the scope of the proposed requirement.

EDF commissioned ICF International to conduct an analysis of the cost effectiveness of conducting leak surveys. Appendix 1 contains a detailed description of the model methodology, inputs, and results. This analysis supports the proposed requirement in Section 95669. The ICF analysis evaluates the costs and benefits of leak surveys at various frequencies and multiple types of facilities, specifically onshore production, gathering and boosting stations, gas processing plants, gas transmission compressor stations, and gas storage facilities. ICF developed a Monte Carlo-based simulation model to analyze the dynamics of various leak survey programs and evaluate the effectiveness of such programs using multiple variables including the frequency of surveys, the value of recovered gas, and the number of third-party contractors conducting the surveys. The ICF analysis did not include costs associated with inspecting components at idle wells or well casing vents. However, like the CARB analysis, ICF also included information on stochastic leaks (or "super-emitters" in its model).

Per the ICF model the average cost effectiveness of conducting quarterly inspections is:

- Production facilities: \$8.58 MT CO<sub>2</sub>e avoided
- Processing facilities: \$11.13 MT CO<sub>2</sub>e avoided
- Gathering and Boosting facilities: \$4.51 MT CO<sub>2</sub>e avoided
- Transmission: \$3.59 MT CO<sub>2</sub>e avoided.

These numbers reflect the use of two third-party contractors, assume a price of \$3 for natural gas, and a global warming potential of 72 over a 20-year time-frame. ICF calculated emissions avoided as the difference between the emissions at the beginning of the first survey and the emissions at the end of each subsequent survey over a three-year period. ICF's analysis demonstrates the reasonableness of ARB's cost effectiveness determination for the LDAR provision.

## II. Quarterly Inspections Are Necessary to Reduce Methane and Air Toxics, as Demonstrated by Recent Field Studies

Frequent inspections of oil and gas facilities have important benefits: (1) they reduce the waste of a valuable product; (2) enhance safety; (3) protect the climate from potent greenhouse gas emissions; and (4) protect human health from harmful air toxics and smog-altering pollution.

A recent field study conducted by Sage Consulting LP (Sage) demonstrate that in addition

<sup>3</sup> Attachment 2, Revised Cost Estimates for the <https://www.arb.ca.gov/regact/2016/oilandgas2016/oilgasatt2.pdf>

F-4-1  
cont.

F-4-2

to being significant sources of methane, oil and gas facilities release harmful air toxics such as benzene and toluene.<sup>4</sup> Sage collected data from 160 components at 39 natural gas production sites between January 20 and August 14, 2015.<sup>5</sup> In addition to methane, benzene, toluene, xylenes and ethylbenzene (BTEX) repeatedly were detected in at least 10% of the samples.<sup>6</sup> Indeed, benzene was detected in 46% of the samples and toluene in 63% of the samples.<sup>7</sup> This data further underscores the importance of frequent leak inspections coupled with expeditious repairs.

F-4-2  
cont.

### III. Recent Data Supports the Declining Leak Thresholds in Section 95669

Data collected during the Sage field study and prior experience across California's Air Pollution Control Districts supports the declining leak thresholds contained in Section 95669(i). The proposed rule requires operators repair leaks of 10,000 ppmv in the first year of rule implementation (2018). This minimum leak threshold declines to 1,000 ppmv as of January 1, 2020. As documented in the Sage field study- there are ample leaks throughout the system above 1,000 ppmv and below 10,000 ppmv. In the study, leaks were found across the system - and the sampling report documents that many more were found which were not recorded in the results. Furthermore, some Air Districts have already been incorporating leak thresholds of 1,000 ppm and below at oil and gas facilities, and Method 21 equipment sensitivity yields highly accurate results below 1,000 ppmv.

F-4-3

We commend CARB on a well-supported proposal to reduce methane, volatile organic compounds and air toxics from onshore and offshore oil and gas facilities.

Thank you for your consideration of these comments.

Sincerely,

Timothy O'Connor  
Director and Senior Attorney  
Environmental Defense Fund

Elizabeth Paranhos  
Attorney and Oil and Gas Consultant  
Delone Law Inc.

Hillary Hull  
Senior Research Analyst  
Environmental Defense Fund

---

<sup>4</sup> Sage ATC Consulting LLC, Air Resources Board RFP No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised).

<sup>5</sup> Sage ATC Consulting LLC, Air Resources Board RFP No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised), at 1-2.

<sup>6</sup> *Id.* at 2-9

<sup>7</sup> *Id.* at Section 2 Appendix D: Descriptive Statistics for Measured Concentrations and Calculated Emissions Rates for Components in Gas Service.





# Economic Analysis of Method 21

December 2016

**Prepared for**

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## Acronyms and Abbreviations

Acronym / Abbreviation	Stands For
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
EDF	Environmental Defense Fund
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Reporting Program
GRI	Gas Research Institute
GWP	Global Warming Potential (72) <sup>1</sup>
LDAR	Leak Detection and Repair
Mcf	Thousand Cubic Feet
NSPS	New Source Performance Standards promulgated under the Federal Clean Air Act
PRV	Pressure Relief Valve
scf	Standard Cubic Feet

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<sup>1</sup> Climate Change 2007 - The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the IPCC (ISBN 978 0521 88009-1 Hardback; 978 0521 70596-7 Paperback) . Table TS.2 Retrieved from: [http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4\\_wg1\\_full\\_report.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4_wg1_full_report.pdf)

## 1. Executive Summary

Leaks of natural gas, also referred to as fugitives, significantly contribute towards the total methane emissions from the oil and gas industry. Leaks occur randomly across all segments of the industry. An effective option to mitigate methane emissions from leaks is to periodically conduct surveys to identify and fix leaks. There is a tradeoff between costs for various frequencies of leak surveys and the resulting reduction in methane emissions. The analyses summarized in this report evaluate the costs and benefits of multiple scenarios in conducting leak surveys and repairs at various frequencies in five segments of the oil and gas industry – onshore production, gathering and boosting stations, gas processing plants, gas transmission compressor stations, and gas storage facilities.

Much of the discussion involving leak detection and repair is based on the average cost and emission factors at a site level. However, such static factors do not reflect the dynamics of leak surveys and associated reduction in emissions. Leak survey and repair programs when conducted on a periodic basis result in the reduction of leaks and prevent some small leaks from turning into larger leaks over time. Fewer leaks require less time to survey and reduce repair costs over time. A static average value based approach does not capture this changing leak frequency and leak magnitude over time. It also does not effectively account for the fact that a few large leaks disproportionately influence the benefits of conducting leak survey and repair programs. These large leaks, referred to as super-emitters, have been observed in real world data on methane emissions from oil and gas facilities.

ICF developed a Monte Carlo-based simulation model to analyze the dynamics of leak survey programs and to evaluate the effectiveness of such programs using multiple variables, such as the frequency of surveys. The model simulates facility characteristics, such as the types and counts of equipment, the number of leaks at a facility, and the size of each leak. These facility characteristics drive the time required to conduct the survey, which in turn influences the costs to conduct a survey. Similarly, the size of the leaks influences both the costs for repair and replacement as well as the amount of reduction achieved through each survey. The data for the model was obtained from several field studies that provide the raw data to develop statistical distributions. The model output includes a statistical distribution of various metrics, including emissions before each survey, emissions reduction after each survey, total costs, and the value of gas saved (if applicable).

In this analysis, the simulation model was run at three levels of leak survey frequency – annual, semi-annual, and quarterly. The value of gas recovered was evaluated at different levels - \$0/Mcf, \$3/Mcf, and \$4/Mcf. For the onshore production and gathering and boosting segments only the \$3/Mcf and \$4/Mcf gas prices were evaluated. The onshore production segment directly accrues the benefit of reducing emissions as it owns the natural gas. The same applies to gathering systems owned or operated by producers. Natural gas processors, gas transmission pipeline operators, and gas storage operators do not own the gas and are provided a service fee. In the case of natural gas processors the service fee varies depending on the contract with the gas producers. In the case of natural gas transmission and storage the service fee is determined through rate cases. Hence, from the operator perspective the value of gas recovered is minimal (processors) to none (transmission and storage).

However, the value of gas emissions reduced is a benefit to the shipper and to the society as a whole. Therefore, to account for both of these perspectives the model was run with a scenario with no recovery of gas value (\$0/Mcf gas price) and two other gas prices at \$3/Mcf and \$4/Mcf. The dollar per Mcf of emissions avoided for each segment and scenario is provided in Table 1 and Table 2. The emissions avoided are defined as the difference between the emissions at the beginning of the first survey and the emissions at the end of each subsequent leak survey after fixing of the leaks. Table 1 shows the cost effectiveness of implementing a Method 21 leak survey program in production, transmission, processing, storage and gathering and boosting with gas prices of \$3/Mcf.

**Table 1: Average Three Year Cost-Effectiveness Results from Individual Facilities (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Industry Segment	Production <sup>2</sup>	Transmission	Processing	Storage	Gathering and Boosting
<b>Gas Recovery Price</b>	\$3/Mcf	\$3/Mcf	\$3/Mcf	\$3/Mcf	\$3/Mcf
<b>Number of Contractor Employees</b>	2	2	2	2	2
<b>Annual Survey</b>	\$2.82 (684 Mcf)	-\$0.44 (10.1 MMscf)	\$8.39 (12.2 MMscf)	-\$0.86 (14.9 MMscf)	\$0.25 (6.1 MMscf)
<b>Semi-annual Survey</b>	\$5.47 (1,259 Mcf)	\$2.06 (20.4 MMscf)	\$8.43 (23.8 MMscf)	\$2.00 (34 MMscf)	\$2.66 (12 MMscf)
<b>Quarterly Survey</b>	\$8.58 (1,761 Mcf)	\$3.59 (27 MMscf)	\$11.13 (31 MMscf)	\$3.35 (47.7 MMscf)	\$4.51 (15.8 MMscf)

Table 2 shows the cost effectiveness of implementing a Method 21 leak survey program in transmission, processing, and storage with a gas prices of \$0/Mcf.

**Table 2: Average Three Year Cost-Effectiveness Results from Individual Facilities (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Industry Segment	Transmission	Processing	Storage
<b>Gas Recovery Price</b>	\$0/Mcf	\$0/Mcf	\$0/Mcf
<b>Number of Contractor Employees</b>	2	2	2
<b>Annual Survey</b>	\$4.88 (10.1 MMscf)	\$13.12 (12.2 MMscf)	\$6.02 (14.9 MMscf)
<b>Semi-annual Survey</b>	\$3.60 (20.4 MMscf)	\$9.82 (23.8 MMscf)	\$4.00 (34 MMscf)

<sup>2</sup> Individual production facilities have fewer components and fewer emissions than other facilities, but there are more production facilities than processing, compressor stations, and storage facilities, making the cumulative impact of production emissions significant.

<b>Quarterly Survey</b>	\$4.21 (27 MMscf)	\$11.69 (31 MMscf)	\$4.21 (47.7 MMscf)
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## 2. Introduction

### 2.1. Goals and Approach of the Study

This report evaluates the costs and emission reductions that can be achieved by using Method 21 to survey oil and gas facilities for leaks and subsequently repairing and replacing equipment to address any leaks found. Currently, most studies that evaluate Leak Detection and Repair (LDAR) programs use an average value of variables, such as emissions, reductions, costs, time taken to conduct survey, and do not take into account the variation in these variables depending on the characteristics of the facilities, such as the size of facility, types of equipment at the facility, and number of leakers. They also do not directly account for larger emitters or from super-emitters. A more representative method to evaluate LDAR's performance is the use of a stochastic modeling approach. This approach allows for the analysis of multiple scenarios with varying conditions unlike the average value approach. The stochastic model gives a range of cost effectiveness for facilities of varying sizes and conditions. This approach gives a better understanding of how an LDAR program can vary across oil and gas facilities of different sizes.

### 2.2. Objective of the Stochastic LDAR Analysis

The stochastic modeling approach to determine the cost-effectiveness of LDAR at oil and gas facilities consists of developing facility models that replicate real world conditions and capture variations in facility size and characteristics. A Monte Carlo simulation was used to analyze facility emissions, reductions, and costs. The Monte Carlo simulation was used to compare various facilities by including inter-relationships between different factors, such as leak frequency and time required to conduct an LDAR survey.

The advantages of using the Monte Carlo simulation for this analysis is that it represents emission rates and activity data obtained from multiple real world studies using statistical distributions. The model therefore is able to replicate real world emissions and capture variations in facility size and characteristics. The model then outputs the cost effectiveness across a wide range of facility types with varying emissions and leak frequency, giving a more representative understanding of emissions.

### 2.3. Limitation of Analysis

While the stochastic model has many benefits, the method does present a few limitations. The model results are driven by the data inputs and therefore are only as good as the applicability of these inputs for a specific facility. The representativeness of results at the national, state, company, or facility level are limited by how well the data collected from limited geographic regions and used in this study characterizes these levels of detail. Additionally, the costs to repair or replace equipment can vary depending on location and complexity of the leak. This study uses the data on repair costs from the



Natural Gas STAR published documents and expert judgement where no data was available. Since data on costs associated with leak magnitudes per component was not available, the determination of whether a leak needs a repair or replacement is based on expert judgment. Lastly, there is limited time series data available on the impact of different LDAR frequencies on the reductions in leak frequencies from subsequent surveys. This study used limited data available from Jonah Energy LLC.<sup>3</sup>

## 3. Approach and Methodology

### 3.1. Overview of Methodology

Each industry segment utilizes a model that relies on segment specific information from field studies and research papers. While differences exist between the various segment specific models, each one follows the same sequence of analysis, as discussed below:

**Step 1** – First, the model defines a driving factor that defines the size of the facility. The driving factor is then used to establish the number of components of each kind associated with a facility of that size. This driving factor varies by industry segment. Production uses the number of wells at a wellpad facility to drive component counts. Processing, transmission and storage each use the number of compressors per facility to drive component counts. Gathering and Boosting use the number of compressors and the number of dehydrators to drive component counts. ICF used data from published field studies to establish a standard discrete distribution for each of the driving factors.

**Step 2** – Next, the model determined the count of associated components using the driving factors. The following components were evaluated as a part of the analysis: valves, connections, pressure relief valves, compressor pressure relief valves, open-ended lines, starter open-ended lines, pressure regulators, and orifice meters. Emissions from all eight sources were evaluated for the production segment, while other segment models focused on valves, connections, pressure relief valves, open-ended lines and orifice meters. Processing also included pressure regulators in the analysis.

In production, the component count was calculated using the number of wells at a wellpad defined in Step 1. The component count follows a uniform distribution between the minimum and maximum number of components identified at facilities with the same number of wells as the number of wells defined in Step 1. As an example, if a facility was defined with 1 well at the wellpad according to Step 1, then the number of valves is determined following a uniform distribution between 6 and 228 based on the data for sites with 1 well, but if facility was defined with 3 wells at a wellpad according to Step 1, then the number of valves is determined following a uniform distribution between 66 and 733 again based on the data for sites with 3 wells.

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<sup>3</sup> Jonah Energy LLC. WCCA Spring Meeting. May 8, 2015

In processing, transmission, and storage, the component counts were calculated using the following equation:

$$C_i = \frac{C_{s,i}}{D_s} D$$

Where:

$C_i$  = Component count  $i$  (e.g. valves or connectors) for the modeled facility.

$C_{s,i}$  = Average component count  $i$  (e.g. valves or connectors) from the data source.

$D_s$  = Average number of compressors per facility as defined in Step 1 from the data source.

$D$  = Number of compressors at an individual facility as defined in Step 1. This value was randomly selected using the Monte Carlo simulation based on the distribution for the dataset. For instance, in processing,  $D$  was defined using the distribution of compressors at a facility in Subpart W.

In gathering and boosting the component count was calculated using the same principle as in transmission, but also included an additional driving factor. Due to the fact that there are few data sources about gathering and boosting, the number of components per compressor was assumed to be similar to transmission stations with the main difference being dehydrators. An additional factor was added to account for this variance as displayed in the following equation:

$$C_i = \frac{C_{s,i}}{D_{s,1}} D_1 + D_2 * A$$

Where:

$C_i$  = Component count  $i$  (e.g. valves or connectors) for the modeled facility.

$C_{s,i}$  = Average component count  $i$  (e.g. valves or connectors) from the data source.

$D_{s,1}$  = Average Number of compressors per facility as defined in Step 1 from the data source.

$D_1$  = Number of compressors at an individual facility as defined in Step 1. This value was randomly selected using the Monte Carlo simulation based on the distribution for the dataset.

$D_2$  = Number of dehydrators per facility as defined in Step 1. This value was randomly selected using the Monte Carlo simulation based on the distribution for the dataset.

$A$  = Activity factor for the number of components per dehydrators as defined in production from GRI.

**Step 3** – The survey time at each facility and associated costs for surveying was based on component counts identified in Step 2. The time required to survey a facility was calculated by multiplying the

average time to survey one unit of a component type by the number of components of that type at the facility. Table 3 lists the average time that was assumed to survey one component based on ICF's expert judgement and field experience.

**Table 3: Time to Survey Equipment in All Segments**

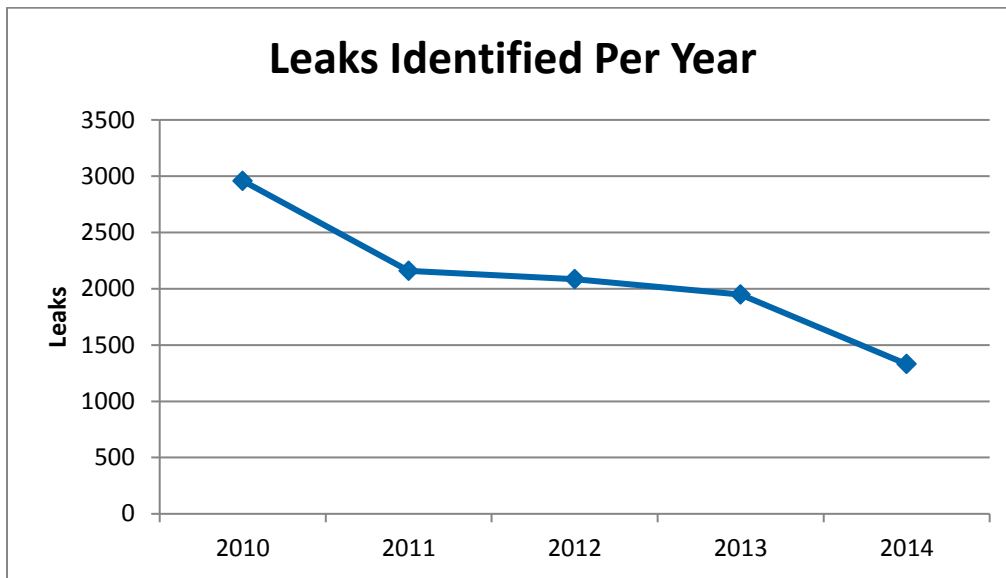
Component Type	Estimated Time to Survey in Seconds for Production Facilities	Estimated Time to Survey in Seconds for all Other Segments
Valve	10	10
Connection	30	30
Pressure Relief Valve	90	90
Compressor Pressure Relief Valve	90	NA
Open-Ended Line	30	30
Starter Open Ended Line	30	NA
Pressure Regulators	15	NA (15 for Processing)
Orifice Meters	120	120

The total time to survey was multiplied by the hourly wage of the contractors. In addition, a per diem and lodging cost for the portion of the day the survey took place was also added into the survey costs. The model assumes all inspections are performed by contractors rather than in-house.

**Step 4** – Next, the model randomly selects the percentage of leaking components. This was done by varying the leak frequency between the minimum and maximum leak frequency as identified at a facility by the published data source. As an example, valves in the processing data source leaked between 5.2% and 10.7% of the time at the various sites in the field study. Therefore, valves in processing were assumed to leak anywhere from 5.2% to 10.7% of the time following a uniform distribution. Each industry segment used the same methodology for determining leaking components as processing, with production varying slightly.

After the first survey in the model, leaks were repaired or components replaced. In the real world new leaks develop over time. However, periodic leak detection and repair programs ensure that the number (or frequency) of leaks go down over time. Data from companies has shown that both the number of leaking components at a facility and the emissions per leak have decreased between surveys. The model tries to account for both of these declines using data presented by Jonah Energy from their survey results. Jonah Energy conducted monthly surveys from 2010 to May 2015 (partial data available

for 2015).<sup>4</sup> In 2010 and in 2014 there were 2,959 and 1,330 leaks respectively. The results from the Jonah study are shown in Figure 1 below.



**Figure 1: Number of Leaks identified by Jonah at sites<sup>5</sup>**

The Jonah data does not provide information on whether the number of sites visited changed over the years. To overcome this data gap, ICF normalized the data and instead analyzed the number of leaks per survey. The number of leaks identified per Jonah's survey changed from 0.90 to 0.45 from 2010 to 2014 or a 50% reduction.

As Jonah data was from monthly surveys, annual, semi-annual, and quarterly surveys were assumed to follow a similar trend to Jonah's data. Annual, semi-annual and quarterly surveys were assumed to follow a similar trend between surveys with a steeper decline in leaks in the first year and slower declines in leaks after. To replicate the reduction in leak frequency, this model sequentially truncated the leak frequency distribution right tail with each successive leak survey. This analysis assumed that the leak frequency would get capped at the 60<sup>th</sup> percentile of the leak frequency distribution for a quarterly leak survey at the end of the 12<sup>th</sup> survey or year three of the analysis. Similarly, the leak frequency distribution is capped at 70<sup>th</sup> percentile for the semi-annual case and 80<sup>th</sup> percentile for the annual case.

**Step 5** – The leak frequency determined in Step 4 was multiplied by the total count of components of each type at a facility as defined in Step 2 to estimate the number of components that are leaking. Each individual leaking component was then randomly assigned leak rates according to the emissions distribution for that source.

<sup>4</sup> Jonah Energy LLC. WCCA Spring Meeting. May 8, 2015

<sup>5</sup> Jonah Energy LLC WCCA Spring Meeting Presentation

In addition to the reduction in leak frequency over successive leak surveys and maintenance practices, emissions per leak also decreases with increased surveying. This is because small leaks do not develop into larger leaks as frequently or because of additional awareness by operators on best practices in preventing leaks. Through Jonah's experience, the value of gas saved decreased from \$117.44 per leak to \$86.41 per leak from 2010 to 2014 or a decrease of 25%. Emission reductions per leak were accounted for in the model by capping the leak rate distribution on the right tail, similar to the leak frequency approach. The full cap was assumed to occur at the end of the sixth survey, regardless of the frequency of surveys. For example, in the annual survey cycle, after six surveys or six years, the leak rate was capped at the 85<sup>th</sup> percentile of the leak rate distribution, or stated differently, the right tail was truncated at the 85<sup>th</sup> percentile. Similarly, for the semi-annual case the leak rate distribution was capped at the 80<sup>th</sup> percentile, and in the quarterly case it is capped at the 75<sup>th</sup> percentile. The emission truncations were calibrated based on the overall emission reductions achieved by Jonah. This ensured that the combination of the leak frequency and the emissions per leak achieved emission reductions that aligned with Jonah's data.

**Step 6** – Next, the model determined if each leak had to be repaired or replaced and then assigned costs accordingly. For valves, connections, pressure relief valves, compressor pressure relief valves, open-ended lines, starter open-ended lines, pressure regulators, and orifice meters the threshold for replacement was determined by using the average of the leak rate distribution of the leaking component type. As an example, if the randomly assigned leak rate for a particular valve in Step 5 was larger than the average valve leak rate as determined from the leak rate distribution for that component type, then the valve was replaced, otherwise it was repaired. If this randomly selected leak rate was half or less than half of the average leak rate then the cost was assumed to be half of the average repair costs. If this randomly selected leak rate was between half the average and the average leak rate, then the repair cost used was the average repair cost. Finally, if the leak rate was between the average and two times the average leak rate, then the average replacement cost was halved, otherwise it was the full replacement cost.

**Step 7** – As companies address leaks through replacement and maintenance, they achieve emission reductions. In the model, replacing components were allocated 100% emission reductions, while maintenance components were allocated less than 100% emission reductions as some components still leak slightly after a repair. Valves, connections, open ended lines were allocated 95% reductions, PRVs 98%, and pressure regulators and orifice meters were allocated 100% of the reductions after maintenance. These emission reductions are outlined in the table below.

**Table 4: Component Emission Reduction Percentage for Maintenance and Replacements**

Component	Percentage Emission Reduction for Maintenance	Percentage Emission Replacement/Overhaul
Valve	95%	100%

<b>Connection</b>	95%	100%
<b>Pressure Relief Valve</b>	98%	100%
<b>Compressor Pressure Relief Valve</b>	98%	100%
<b>Open-Ended Line</b>	95%	100%
<b>Starter Open Ended Line</b>	95%	100%
<b>Pressure Regulators</b>	100%	100%
<b>Orifice Meters</b>	100%	100%

**Step 8** – The simulation was run for 10,000 iterations with each iteration representing a unique and random combination of facility characteristics including the count and type of equipment and component, the number of leakers for each component type, and the leak rate of each leaking component. The model then calculated the cost effectiveness for emissions referred to in this analysis as the \$/Mcf avoided. The \$/Mcf avoided metric is the ratio of the total cost to conduct an LDAR survey (less any value of gas recovered) and the difference in Mcf of emissions between the emissions at the end of the survey level to the level of uncontrolled emissions during the first year that surveys begin. The total cost of conducting an LDAR survey includes the cost of surveying, travel and lodging for the survey team, repair and maintenance costs, and the gas value saved by implementing repairs.

Steps 1 through 8 can be seen in Figure 2.

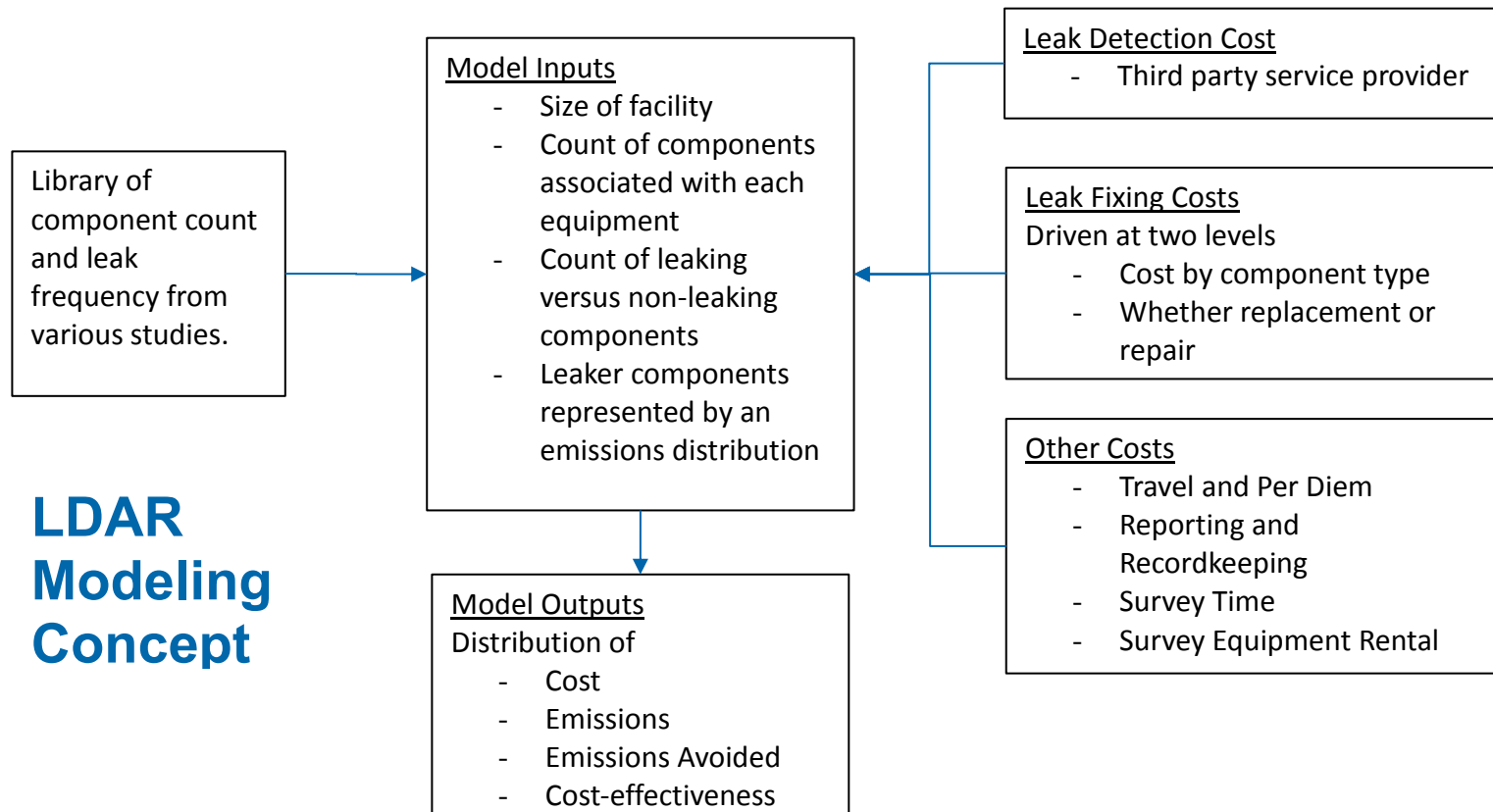


Figure 2: Schematic of LDAR Modeling Concept

### 3.2. All Segments Assumptions

In each of the models (Production, Processing, Transmission, Storage and Gathering and Boosting), there were constant inputs independent of the industry segment. Survey equipment costs displayed in Table 5 and the contractors billing rate (\$60 per hour) were constant variables across all industry segments based on ICF expert judgement, field experience and vendor research. These assumptions drive the labor and equipment costs for surveying.

**Table 5: Survey Equipment Costs in All Segments**

Component	Default Costs
Toxic Vapor Analyzer (TVA)/Organic Vapor Analyzer (OVA)	\$15,000
Vehicle (4x4 Truck)	\$22,000

### 3.3. Production Data Sources

In production, eight component types were represented in the model to calculate the cost effectiveness of implementing Method 21 as an LDAR program. Each component was modeled using reports and data from site visits and measurement studies at wellpads in production. The resources used are as follows:

- *City of Fort Worth Natural Gas Air Quality Study*<sup>6</sup>: This study was utilized to determine the emission distributions for valves, connections, pressure relief valves, open-ended lines and pressure regulators. This source was also used to determine the number of components at a site for valves and connectors. Lastly, this study provided the distribution of wells at a wellpad that was used to drive the component counts at a facility.
- *Methane Emissions from the Natural Gas Industry EPA/ GRI*<sup>7</sup>: This study was utilized to determine the emission distributions on compressor pressure relief valves, starter open-ended lines and orifice meters.

### 3.4. Transmission, Storage, and Gathering and Boosting Data Sources

Five component types were represented in the model to calculate the cost effectiveness of implementing an LDAR program in transmission, storage and gathering and boosting. Each component was modeled using reports and data from site visits and measurement studies at compressor stations. These sources included the following:

<sup>6</sup> <http://fortworthtexas.gov/gaswells/air-quality-study/final/>

<sup>7</sup> Gas Research Institute. *Methane Emissions from the Natural Gas Industry*. June 1996



- Two EDF methane emission studies were utilized to determine the emissions distributions for valves, connections, and open-ended lines.
  - *Methane Emissions from Leak and Loss Audits of Natural Gas Compressor Stations and Storage Facilities*<sup>8</sup>
  - *Methane Emissions from the Natural Gas Transmission and Storage System in the United States*<sup>9</sup>
- *Clearstone Phase 1 Study*:<sup>10</sup> This study was utilized to determine the emissions distributions for pressure relief valves and orifice meters. Additionally, data from this study was used to determine the leak frequencies for pressure relief valves, open-ended lines, and orifice meters.
- *Methane Emissions from the Natural Gas Industry EPA/ GRI*<sup>11</sup>: This study was utilized for equipment counts per compressor, for valves, connections, pressure relief valves, and open-ended lines.
- *New Source Performance Standards*<sup>12</sup>: This regulation was utilized to provide leak frequencies for valves and connections.

### 3.5. Processing Data Sources

In processing, six component types were represented in the model to calculate the cost effectiveness of implementing an LDAR program. Each component was modeled using a report and data from site visits and measurement studies at processing facilities.

- *Clearstone Phase 1 Study*:<sup>13</sup> This study was used to model emission distributions, leak frequency and component counts at processing facilities.

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<sup>8</sup> <http://pubs.acs.org/doi/abs/10.1021/es506163m>

<sup>9</sup> <http://pubs.acs.org/doi/abs/10.1021/acs.est.5b01669>

<sup>10</sup> Clearstone Engineering LTD. "Identification and Evaluation of Opportunities to Reduce Methane Losses at Four Gas Processing Plants" retrieved from: [https://www.epa.gov/sites/production/files/2016-08/documents/four\\_plants.pdf](https://www.epa.gov/sites/production/files/2016-08/documents/four_plants.pdf)

<sup>11</sup> Gas Research Institute. *Methane Emissions from the Natural Gas Industry*. June 1996

<sup>12</sup> 40 CFR Part 60 standards of Performance for New Stationary Sources. <http://www.ecfr.gov/cgi-bin/text-idx?SID=d4fff6638508368c7aca1992302d12fa&mc=true&node=pt40.7.60&rgn=div5>

<sup>13</sup> "Identification and Evaluation of Opportunities to Reduce Methane Losses at Four Gas Processing Plants"

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## 4. Analytical Results

### 4.1. Average Facility Size

Statistical distributions of facility sizes were fitted from raw data collected in production, transmission, processing, storage and gathering and boosting. This data was used to represent the range of variation within an industry segment, but the median facility size for each of these industry segments is portrayed below:

**Table 6 Median Facility Size**

	Production	Transmission	Processing	Storage	Gathering and Boosting
Wells	3	NA	NA	NA	NA
Compressors	NA	4	7	6	2
Dehydrators	NA	NA	NA	NA	0.5
Valve	190	663	3,293	3,411	335
Connection	1,416	3,022	16,520	10,172	1,519
Pressure Relief Valve	3	14	77	121	8
Compressor Pressure Relief Valve	>0	NA	NA	NA	NA
Open-Ended Line	33	50	324	645	25
Starter Open Ended Line	>0	NA	NA	NA	NA
Pressure Regulators	1	NA	34	NA	NA
Orifice Meters	2	9	34	12	2

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## 4.2. All Segments Results

Model runs were conducted for five industry segments (Production, Transmission, Processing, Storage and Gathering and Boosting) as outlined in Section 2. The value of gas and the number of contractor employees necessary to complete a survey were varied during the model runs for each industry segment, yielding the results displayed in Sections 4.3 to 4.7. The three scenarios include parameter combinations of the value of gas between \$3/Mcf and \$4/Mcf, and the number of contractor employees necessary to complete a Method 21 survey between 1 and 2. As contractors may utilize one or two personnel to complete a survey, the labor costs were adjusted based on the number of employees conducting a survey, with all other assumptions remaining constant. Additionally, Transmission, Processing, and Storage also completed two model runs where they assumed no value for the gas saved (i.e. \$0/Mcf).

Four model runs were conducted that utilized a specified gas price and a specified number of contractor employees. These model runs include annual surveying, semi-annual surveying, and quarterly surveying. The cost of annual surveying is less than semi-annual surveying which is less than quarterly surveying. The emission reductions per year are inversely correlated with costs with quarterly achieving higher emission reductions than semi-annual which are higher than annual. Surveying efficiencies (i.e. time to survey, emission volume truncation and leak frequency truncation) are achieved over multiple surveys.

The results are based on the modeled assumption that the survey and repairs were completed at the end of the survey period. Annual surveys were conducted at the end of the year, semi-annual surveys in the middle and end of a year and the quarterly surveys every three months starting three months after the starting period. The emissions avoided in the first period are zero, as no repairs were completed until after the survey. This means that annual surveying did not achieve emission reductions until after the first survey; therefore, over the three year time period the model evaluates, annual surveying conducted three surveys but only the second and third time period achieved avoided emissions. Semi-annual illustrates six surveys, but repairs were conducted after the first one allowing five surveys to achieve avoided emissions. Quarterly illustrates twelve surveys, with eleven that have avoided emissions.

### 4.3. Production

In production, three different scenarios were modeled to evaluate how emissions could change over time. Table 7 below displays the average cost effectiveness over a three year cycle. Each scenario is displayed yearly in Section 4.7.A.1.

**Table 7: Production Scenario Average Three Year Cost-Effectiveness Results (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Case Number	1	2	3
Gas Price	\$3/Mcf	\$4/Mcf	\$3/Mcf
Number of Contractor Employees	2	2	1
Annual Survey	\$2.82 (684 Mscf)	\$0.58 (684 Mscf)	\$0.06 (684 Mscf)
Semi-annual Survey	\$5.47 (1,259 Mscf)	\$4.58 (1,259 Mscf)	\$3.14 (1,259 Mscf)
Quarterly Survey	\$8.58 (1,761 Mscf)	\$8.15 (1,761 Mscf)	\$5.73 (1,761 Mscf)

The emissions avoided due to implementing Method 21 surveying were estimated by the model. Table 8 below displays the percent of emissions avoided in the third year by implementing Method 21 surveying at a facility. The emissions avoided account for the difference in emissions in year three compared with the emissions in the base case. The emissions avoided percentages account for emissions avoided from fugitives from the following sources: valves, connections, pressure relief valves, compressor pressure relief valves, open-ended lines, starter open-ended lines, pressure regulators, and orifice meters. This percentage is not indicative of the total emission reduction opportunities at a facility.

**Table 8: Year Three Emissions Avoided Compared with Baseline Emissions**

Case Number	1 ,2, and 3
Annual Survey	50%
Semi-annual Survey	66%
Quarterly Survey	78%

## 4.4. Transmission

The Transmission segment is by law structured such that the operator does not own the gas and only collects a service fee for the volume of gas being moved through its pipelines. Therefore, any emissions avoided do not provide any direct monetary value to the operator. This suggests using no recovery for the value of gas saved (or emissions avoided). On the other hand, at an economy level it can be argued that some entity who owns the gas (typically the producer) will benefit from any recovery of gas. For example, if the transmission operator is regulated then the costs to comply with the regulation can be passed on to the entity that owns the gas. Hence, the owner of the gas pays additional fees to cover for the LDAR program and gets the value of gas saved. This suggests the use of full value of gas price in the analysis. This study did not try to resolve this issue, but rather ran the model with no recovery and recovery at full gas price as scenarios, thus providing a range of costs associated with conducting an LDAR program in this segment. In transmission, five different scenarios were modeled to evaluate how emissions could change over time. Table 9 below displays the results for the average cost effectiveness of the first three years. Each scenario is displayed yearly in Section 4.7.A.2.

**Table 9: Transmission Scenario Average Three Year Cost-Effectiveness Results (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMscf) in Parentheses**

Case Number	1	2	3	4	5
Gas Recovery Price	\$3/Mcf	\$4/Mcf	\$3/Mcf	\$0/Mcf	\$0/Mcf
Number of Contractor Employees	2	2	1	2	1
Annual Survey	-\$0.44 (10.1 MMscf)	-\$2.21 (10.1 MMscf)	-\$0.93 (10.1 MMscf)	\$4.88 (10.1 MMscf)	\$4.38 (10.1 MMscf)
Semi-annual Survey	\$2.06 (20.4 MMscf)	\$1.55 (20.4 MMscf)	\$1.68 (20.4 MMscf)	\$3.60 (20.4 MMscf)	\$3.22 (20.4 MMscf)
Quarterly Survey	\$3.59 (27 MMscf)	\$3.38 (27 MMscf)	\$3.10 (27 MMscf)	\$4.21 (27 MMscf)	\$3.73 (27 MMscf)

The emissions avoided due to implementing Method 21 surveying were estimated by the model. Table 10 below displays the percent of emissions avoided in the third year by implementing Method 21 surveying at a facility. The emissions avoided account for the difference in emissions in year three compared with the emissions in the base case. The emissions avoided percentages account for emissions avoided from fugitives from the following sources: valves, connections, pressure relief valves, open-ended lines and orifice meters. This percentage is not indicative of the total emission reduction opportunities at a facility.

**Table 10: Year Three Emissions Avoided Compared with Baseline Emissions**

Case Number	1 ,2, and 3
Annual Survey	63%
Semi-annual Survey	85%
Quarterly Survey	90%

## 4.5. Processing

The gas processing segment by contractual arrangements collects a service fee on the volume of gas processed. In some instances, the processing plant may be able to increase service fee because of increased throughput due to gas saved. However, this is a fraction of the total value of gas saved. Therefore, similar to the transmission segment this study analyzed scenarios with and without value of gas saved being included. In processing, five different scenarios were modeled to evaluate how emissions could change over time. Table 11 below displays the results for the average cost effectiveness of the first three years. Each scenario is displayed yearly in 4.7.A.3.

**Table 11: Processing Scenario Average Three Year Cost-Effectiveness Results (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Case Number	1	2	3	4	5
Gas Recovery Price	\$3/Mcf	\$4/Mcf	\$3/Mcf	\$0/Mcf	\$0/Mcf
Number of Contractor Employees	2	2	1	2	1
Annual Survey	\$8.39 (12.2 MMscf)	\$6.81 (12.2 MMscf)	\$6.49 (12.2 MMscf)	\$13.12 (12.2 MMscf)	\$11.23 (12.2 MMscf)
Semi-annual Survey	\$8.43 (23.8 MMscf)	\$7.97 (23.8 MMscf)	\$6.93 (23.8 MMscf)	\$9.82 (23.8 MMscf)	\$8.31 (23.8 MMscf)
Quarterly Survey	\$11.13 (31 MMscf)	\$10.95 (31 MMscf)	\$9.16 (31 MMscf)	\$11.69 (31 MMscf)	\$9.72 (31 MMscf)

The emissions avoided due to implementing Method 21 surveying were estimated by the model. Table 12 below displays the percent of emissions avoided in the third year by implementing Method 21 surveying at a facility. The emissions avoided account for the difference in emissions in year three compared with the emissions in the base case. The emissions avoided percentages account for emissions avoided from fugitives from the following sources: valves, connections, pressure relief valves, open-ended lines, orifice meters, and pressure regulators. This percentage is not indicative of the total emission reduction opportunities at a facility.

**Table 12: Year Three Emissions Avoided Compared with Baseline Emissions**

Case Number	1 ,2, and 3
Annual Survey	66%
Semi-annual Survey	87%
Quarterly Survey	92%

## 4.6. Storage

Similar to transmission, storage operators can only collect service fee. Therefore, similar to the transmission segment multiple scenarios were evaluated with and without the value gas recovered included in the analysis. In storage, five different scenarios were modeled to evaluate how emissions could change over time. Table 13 below displays the results for the average cost effectiveness of the first three years. Each scenario is displayed yearly in 4.7.A.4.

**Table 13: Storage Scenario Average Three Year Cost-Effectiveness Results (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Case Number	1	2	3	4	5
Gas Recovery Price	\$3/Mcf	\$4/Mcf	\$3/Mcf	\$0/Mcf	\$0/Mcf
Number of Contractor Employees	2	2	1	2	1
Annual Survey	-\$0.86 (14.9 MMscf)	-\$3.16 (14.9 MMscf)	-\$1.83 (14.9 MMscf)	\$6.02 (14.9 MMscf)	\$5.06 (14.9 MMscf)
Semi-annual Survey	\$2.00 (34 MMscf)	\$1.34 (34 MMscf)	\$1.32 (34 MMscf)	\$4.00 (34 MMscf)	\$3.31 (34 MMscf)
Quarterly Survey	\$3.35 (47.7 MMscf)	\$3.06 (47.7 MMscf)	\$2.50 (47.7 MMscf)	\$4.21 (47.7 MMscf)	\$3.36 (47.7 MMscf)

The emissions avoided due to implementing Method 21 surveying were estimated by the model. Table 14 below displays the percent of emissions avoided in the third year by implementing Method 21 surveying at a facility. The emissions avoided account for the difference in emissions in year three compared with the emissions in the base case. The emissions avoided percentages account for emissions avoided from fugitives from the following sources: valves, connections, pressure relief valves, open-ended lines and orifice meters. This percentage is not indicative of the total emission reduction opportunities at a facility.

**Table 14: Year Three Emissions Avoided Compared with Baseline Emissions**

Case Number	1 ,2, and 3
Annual Survey	54%
Semi-annual Survey	77%
Quarterly Survey	84%

## 4.7. Gathering and Boosting

In gathering and boosting, three different scenarios were modeled to evaluate how emissions could change over time. Table 15 below displays the results for the average cost effectiveness of the first three years. Each scenario is displayed yearly in A.5.

**Table 15: Gathering and Boosting Scenario Average Three Year Cost-Effectiveness Results (\$/Metric Tonnes CO<sub>2</sub>e Avoided) with Total Emissions Avoided over the First Three Years (MMcf) in Parentheses**

Case Number	1	2	3
Gas Price	\$3/Mcf	\$4/Mcf	\$3/Mcf
Number of Contractor Employees	2	2	1
Annual Survey	\$0.25 (6.1 MMscf)	-\$1.40 (6.1 MMscf)	-\$0.18 (6.1 MMscf)
Semi-annual Survey	\$2.66 (12 MMscf)	\$2.17 (12 MMscf)	\$2.32 (12 MMscf)
Quarterly Survey	\$4.51 (15.8 MMscf)	\$4.31 (15.8 MMscf)	\$4.07 (15.8 MMscf)

The emissions avoided due to implementing Method 21 surveying were estimated by the model. Table 16 below displays the percent of emissions avoided in the third year by implementing Method 21 surveying at a facility. The emissions avoided account for the difference in emissions in year three compared with the emissions in the base case.

**Table 16: Year Three Emissions Avoided Compared with Baseline Emissions**

Case Number	1 ,2, and 3
Annual Survey	64%
Semi-annual Survey	86%
Quarterly Survey	91%



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## Appendix A. Detailed Results

For the Production and Gathering and Boosting segments listed below, three cases of performing Method 21 for an LDAR survey are presented. For the Transmission, Processing, and Storage segments, five cases of performing Method 21 for an LDAR survey are presented. Each case varies the gas price and the number of contractor employees utilized to perform the survey. Each case represents a different economic impact to enlist an LDAR program for a median sized facility. For each case, the figures below show the cost effectiveness of the LDAR program based on a median emissions reduction volume at the end of the third year. The results are displayed based on the frequency of testing, either annually, semiannually, or quarterly. Additionally, the price per metric tonne CO<sub>2</sub>e avoided for each case is presented, also on a frequency of testing basis.

## A.1. Production

### A.1.1. Case 1 - \$3/Mcf Gas Value and Two Contractors

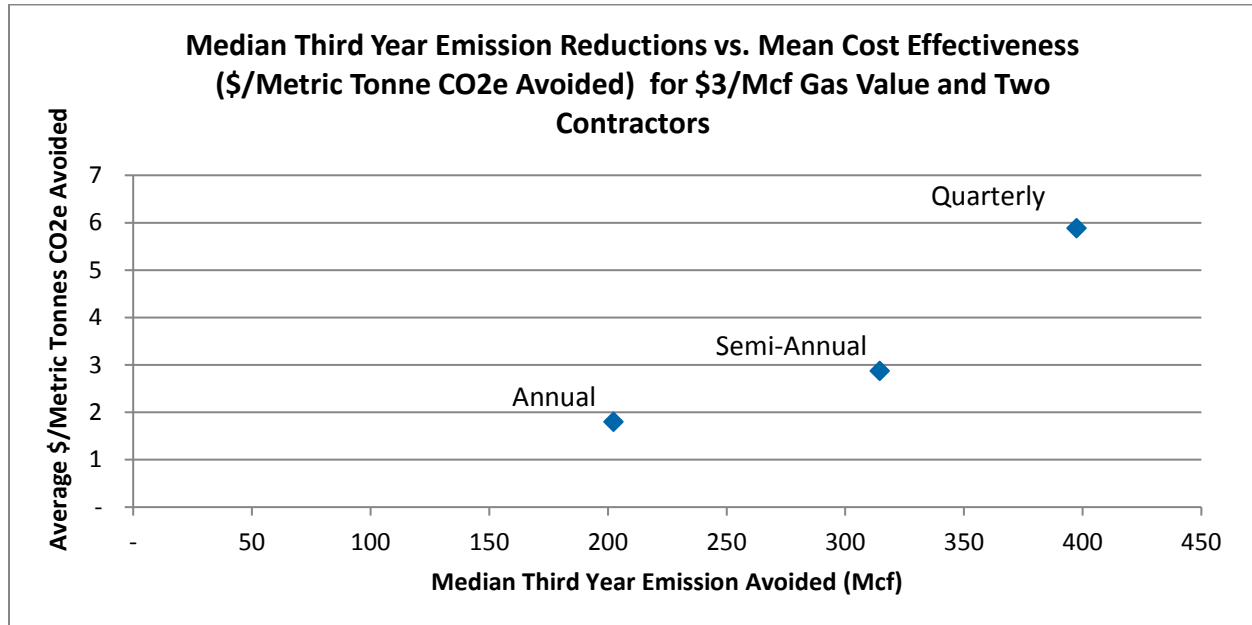


Figure 3: Production Case 1 Cost Effectiveness

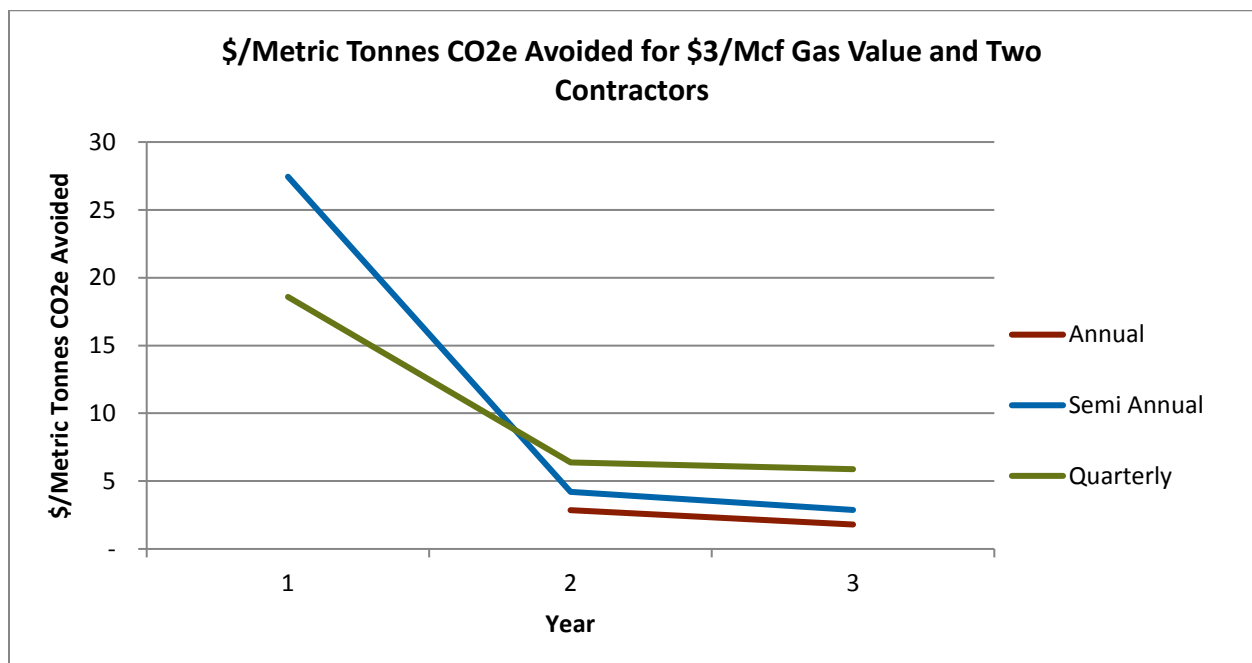


Figure 4: Production Case 1 CO<sub>2</sub>e Avoided

### A.1.2. Case 2 - \$4/Mcf Gas Value and Two Contractors

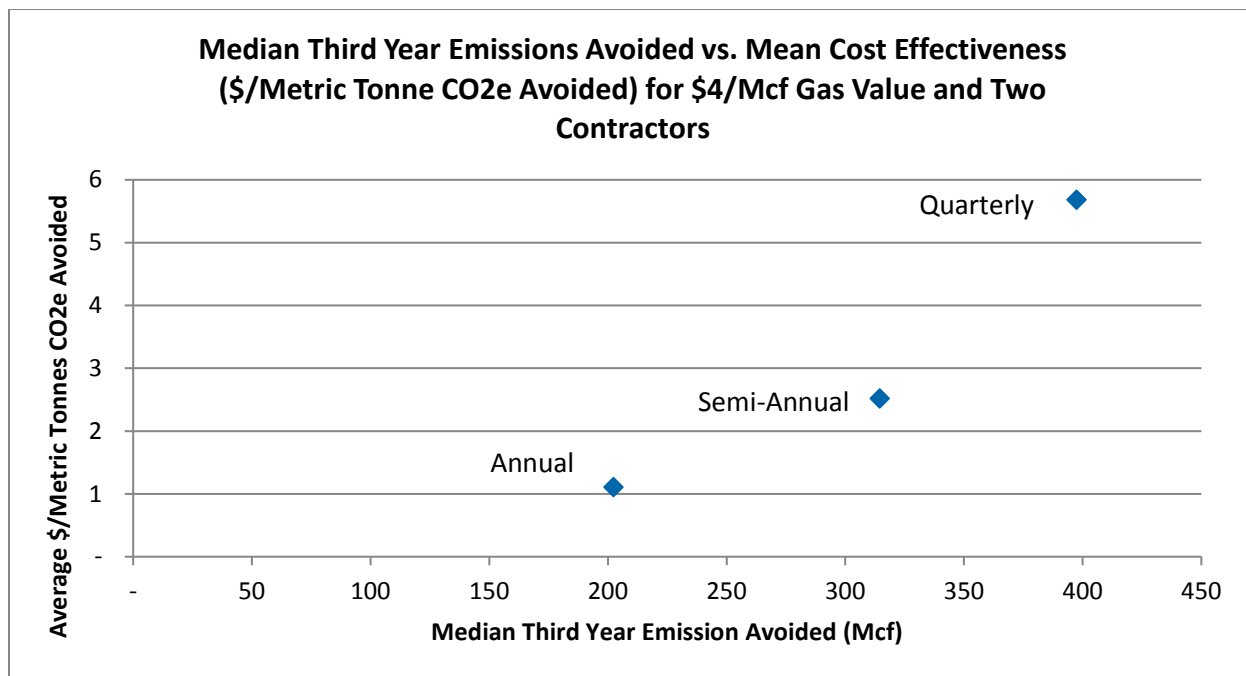


Figure 5: Production Case 2 Cost Effectiveness

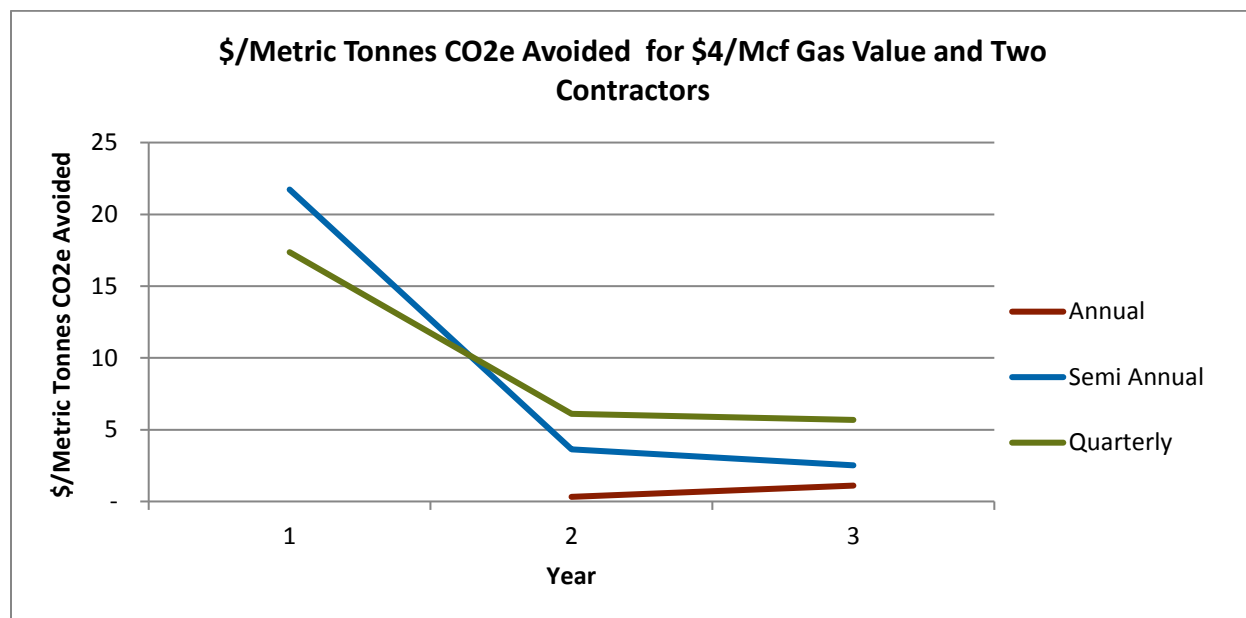


Figure 6: Production Case 2 CO<sub>2</sub>e Avoided

### A.1.3. Case 3 - \$3/Mcf Gas Value and One Contractor

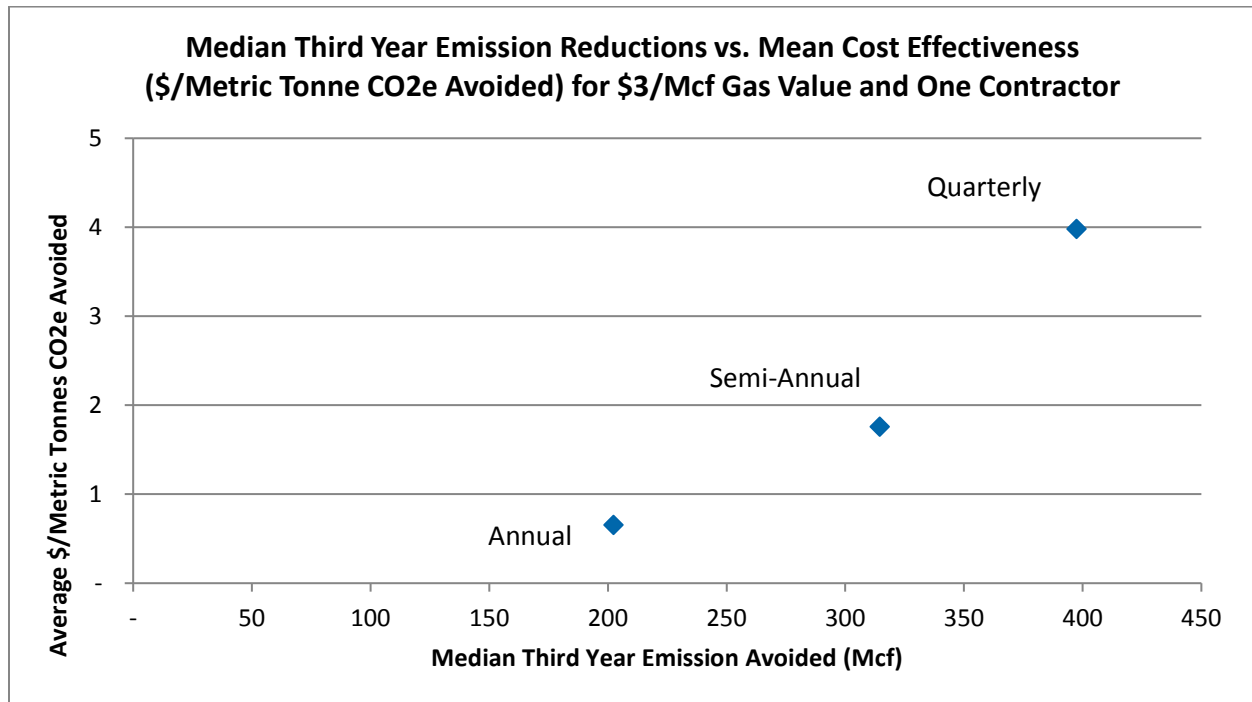


Figure 7: Production Case 3 Cost Effectiveness

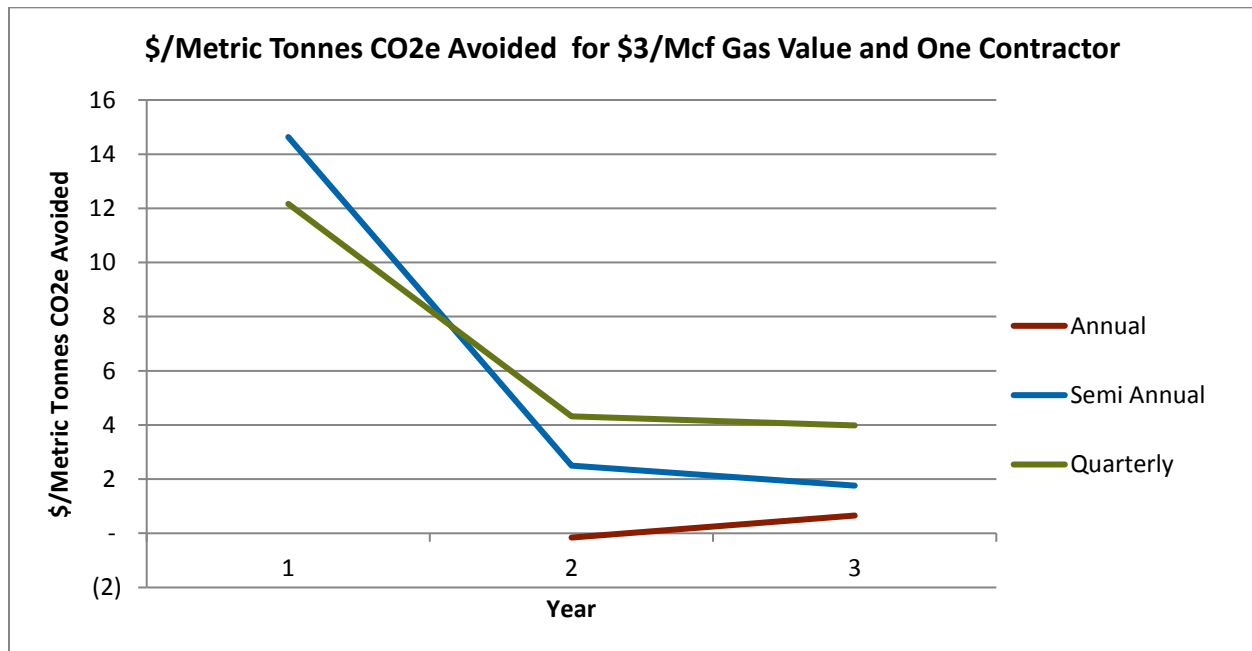


Figure 8: Production Case 3 CO<sub>2</sub>e Avoided

## A.2. Transmission

### A.2.1. Case 1 - \$3/Mcf Gas Value and Two Contractors

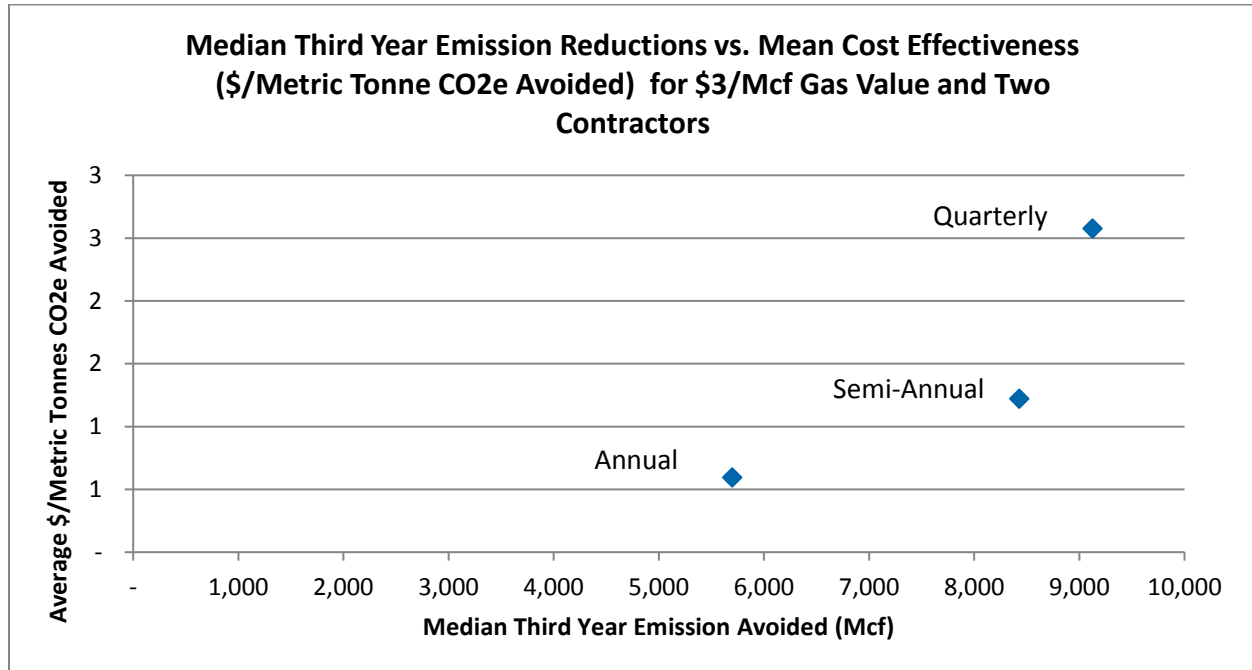


Figure 9: Transmission Case 1 Cost Effectiveness

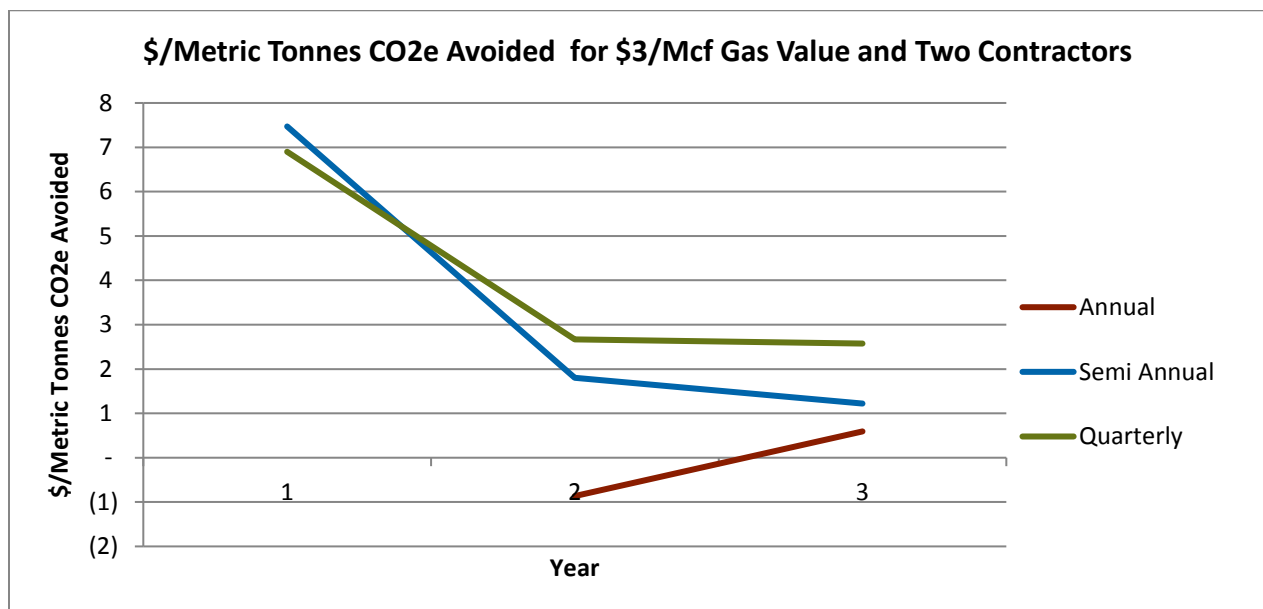


Figure 10: Transmission Case 1 CO<sub>2</sub>e Avoided

### A.2.2. Case 2 - \$4/Mcf Gas Value and Two Contractors

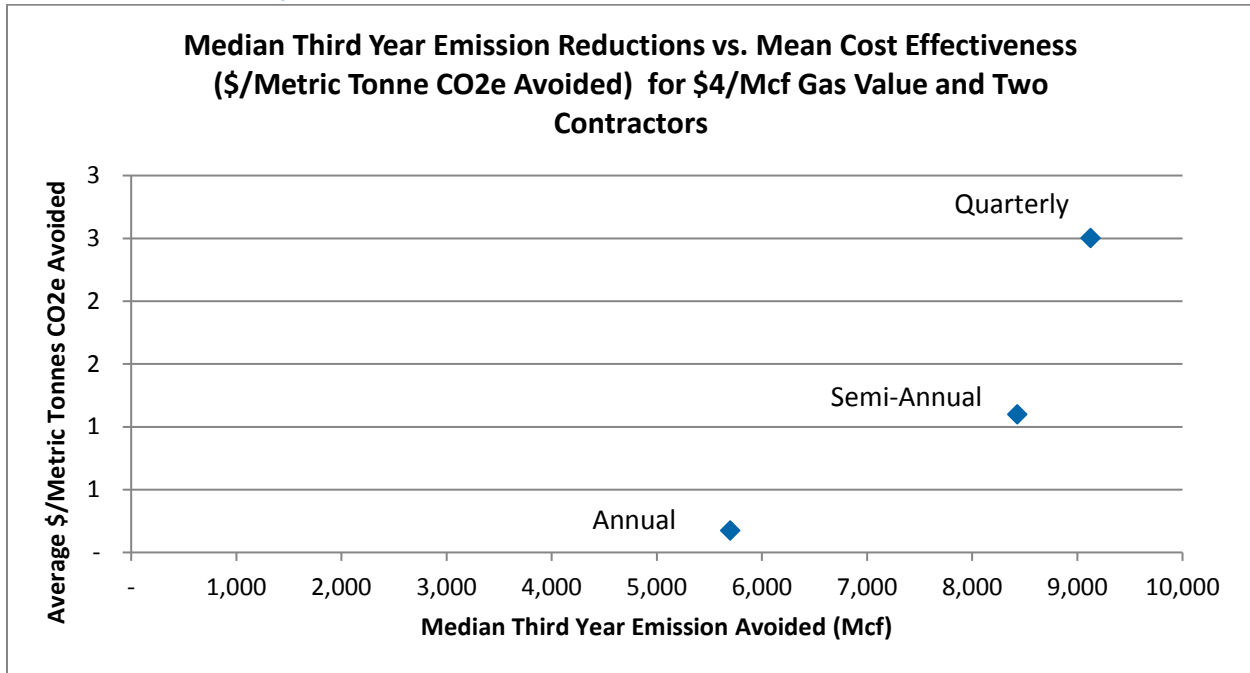


Figure 11: Transmission Case 2 Cost Effectiveness

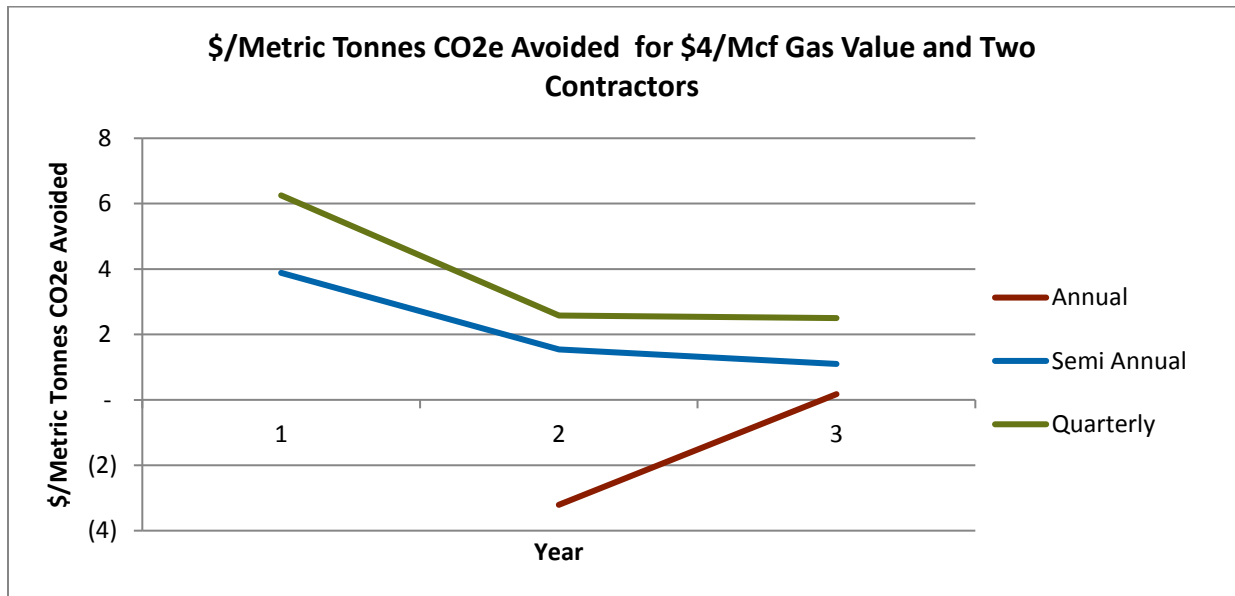


Figure 12: Transmission Case 2 CO<sub>2</sub>e Avoided

### A.2.3. Case 3 - \$3/Mcf Gas Value and One Contractor

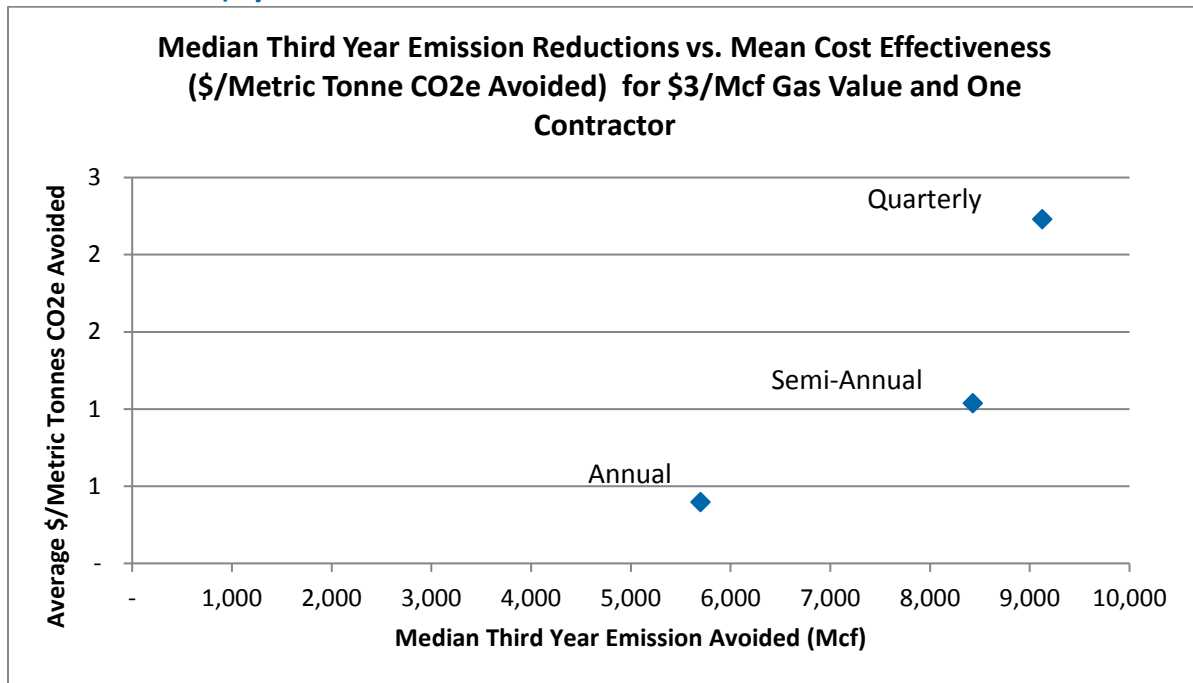


Figure 13: Transmission Case 3 Cost Effectiveness

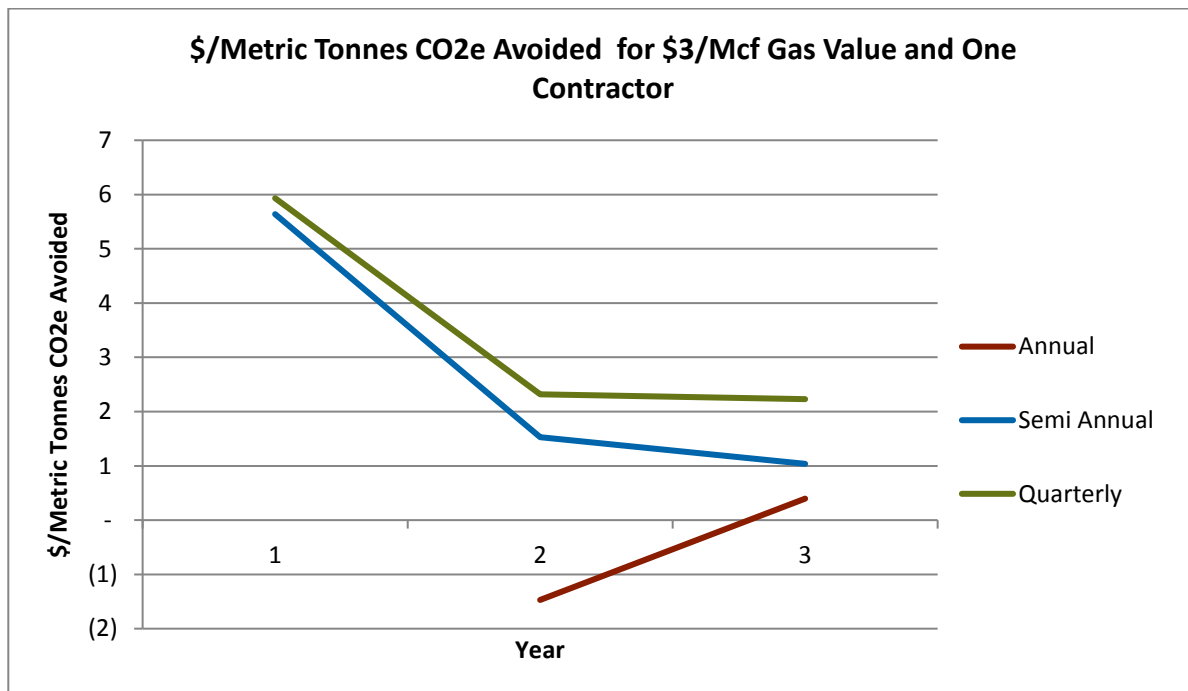


Figure 14: Transmission Case 3 CO<sub>2</sub>e Avoided

#### A.2.4. Case 4 - \$0/Mcf Gas Value and Two Contractors

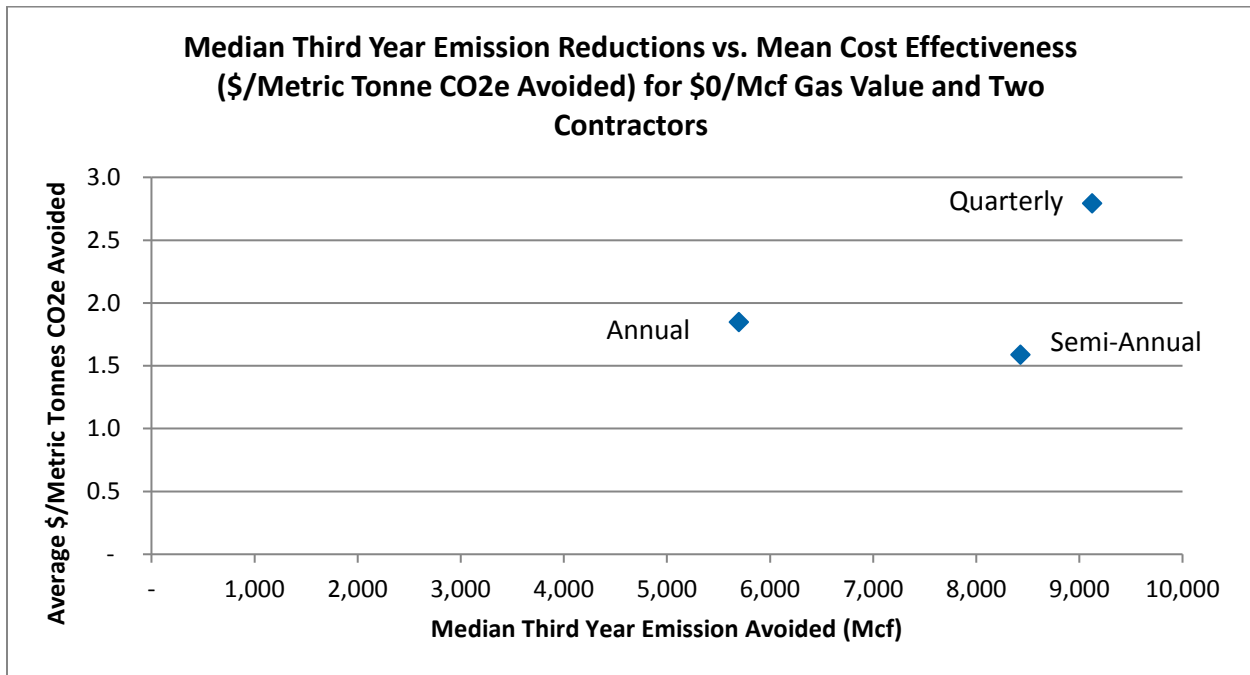


Figure 15: Transmission Case 4 Cost Effectiveness

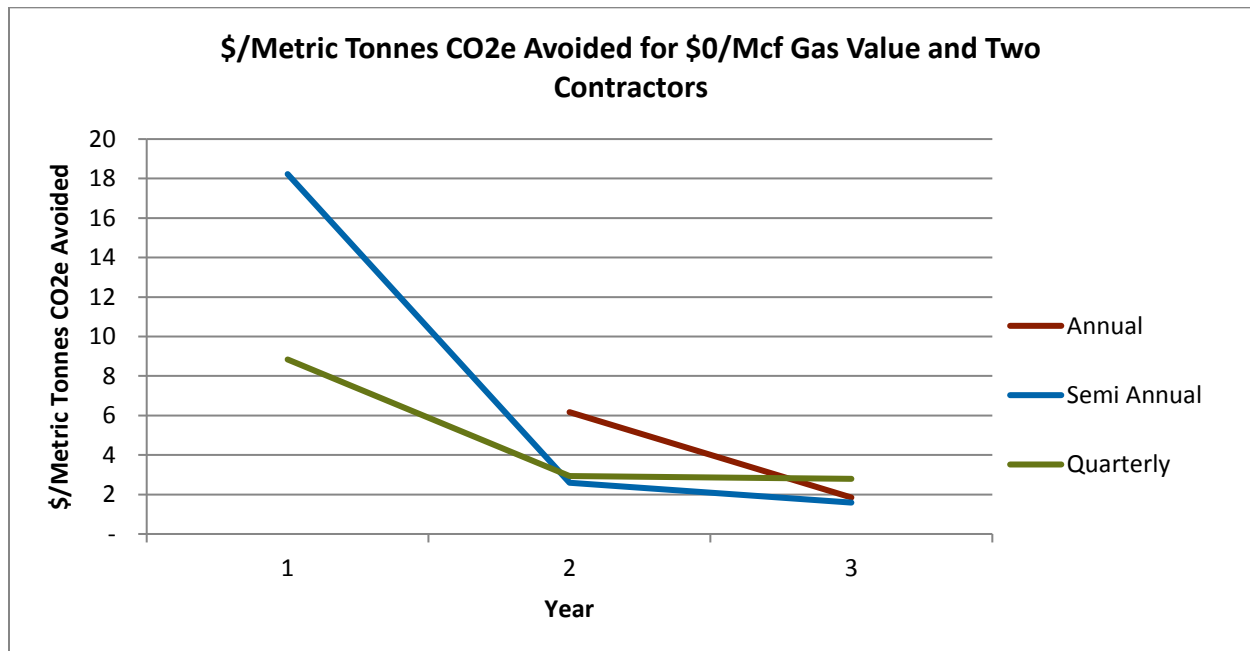


Figure 16: Transmission Case 4 CO<sub>2</sub>e Avoided



### A.2.5. Case 5 - \$0/Mcf Gas Value and One Contractor

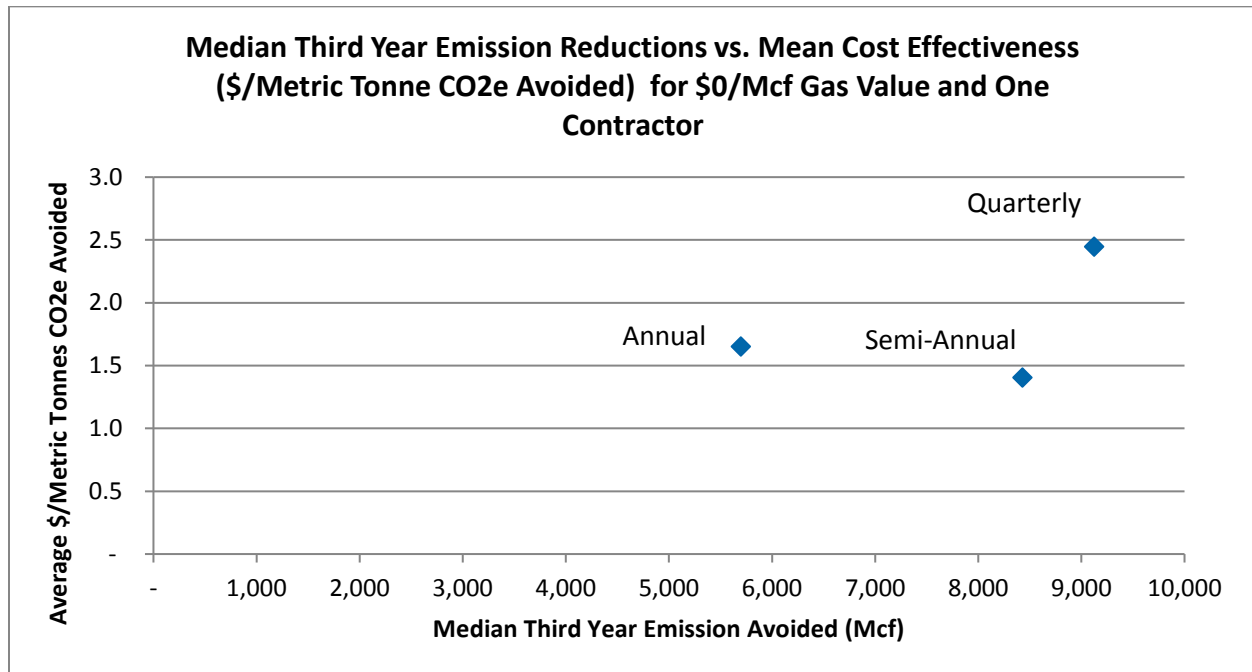


Figure 17: Transmission Case 5 Cost Effectiveness

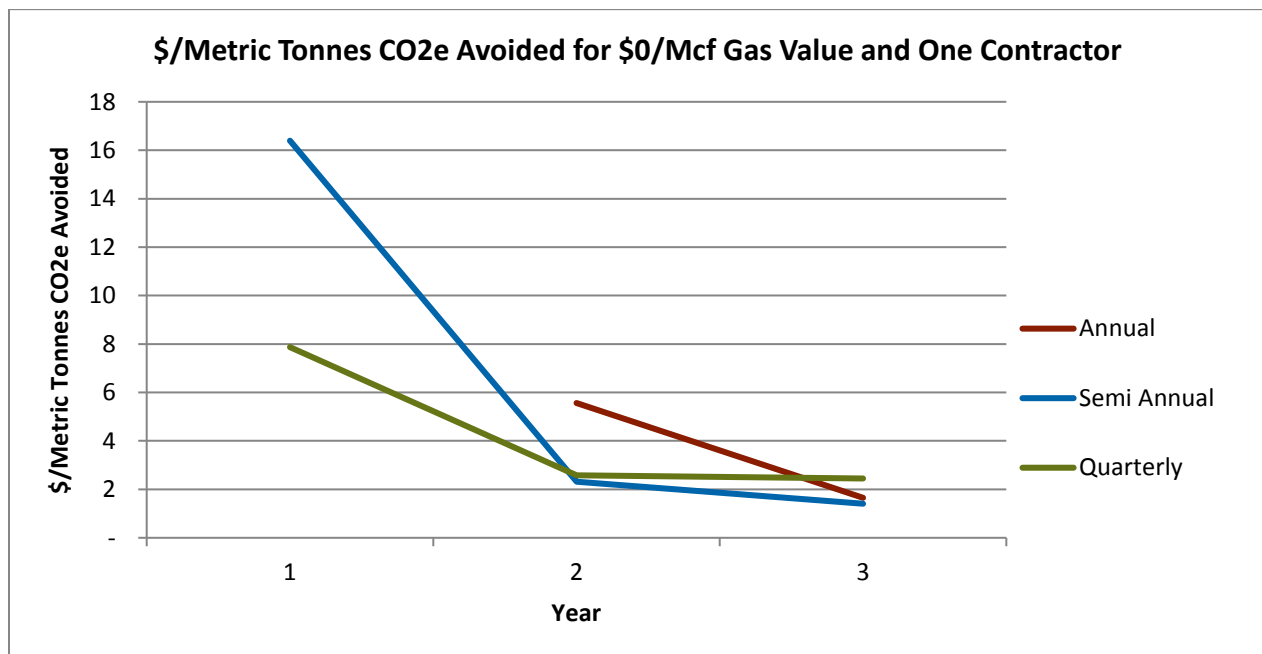


Figure 18: Transmission Case 5 CO<sub>2</sub>e Avoided

### A.3. Processing

#### A.3.1. Case 1 - \$3/Mcf Gas Value and Two Contractors

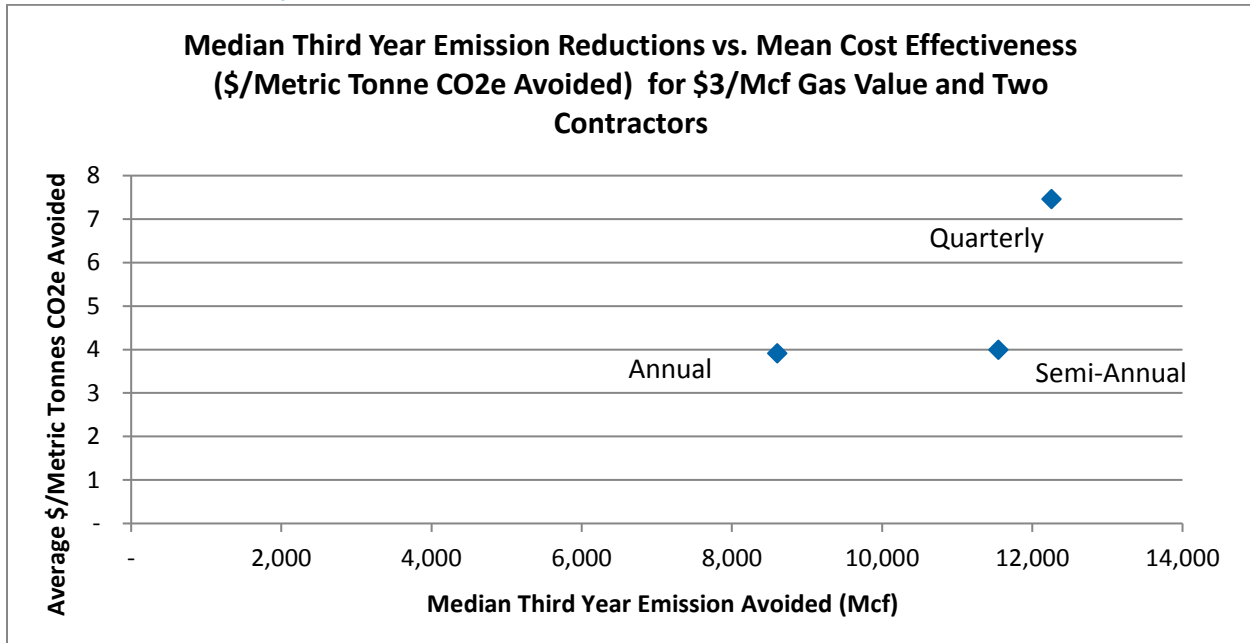


Figure 19: Processing Case 1 Cost Effectiveness

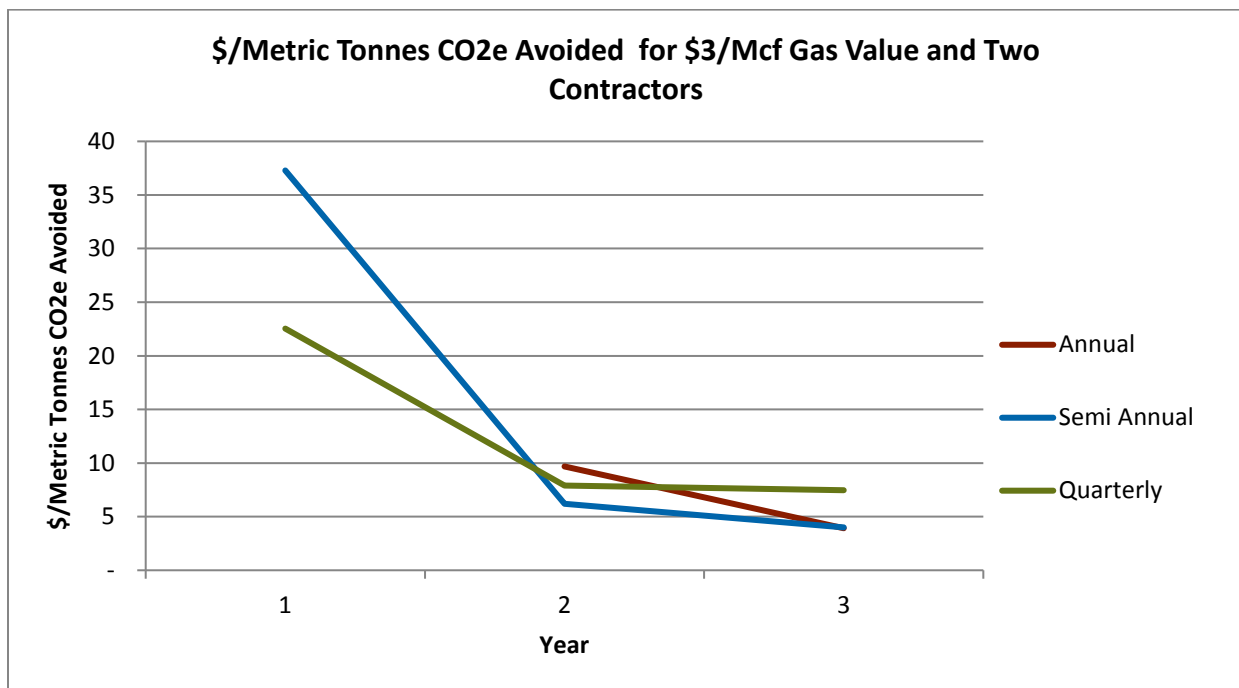


Figure 20: Processing Case 1 CO<sub>2</sub>e Avoided

### A.3.2. Case 2 - \$4/Mcf Gas Value and Two Contractors

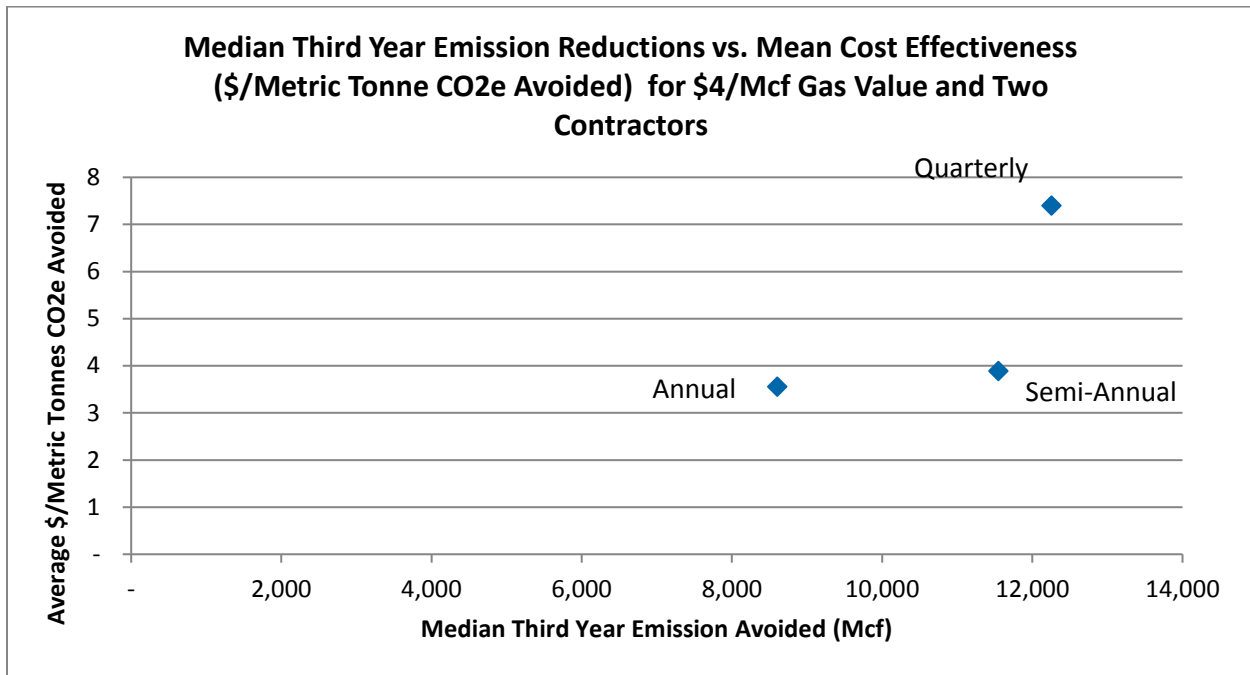


Figure 21: Processing Case 2 Cost Effectiveness

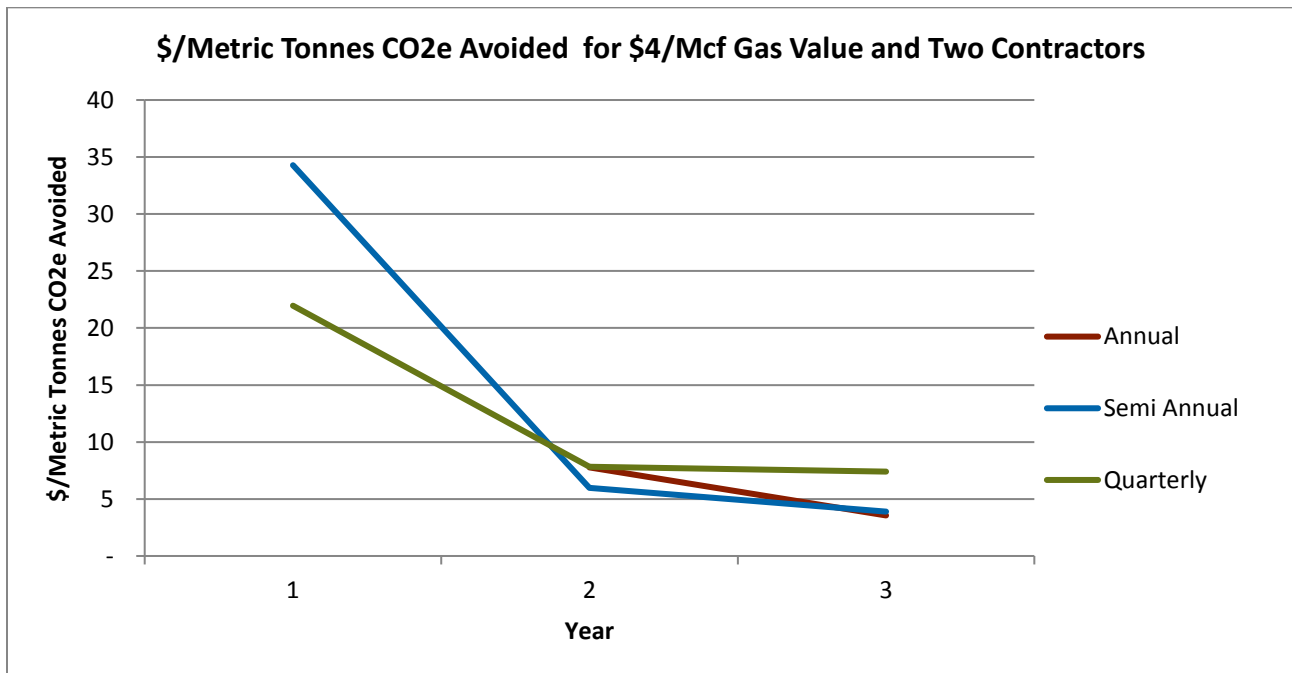


Figure 22: Processing Case 2 CO<sub>2</sub>e Avoided

### A.3.3. Case 3 - \$3/Mcf Gas Value and One Contractor

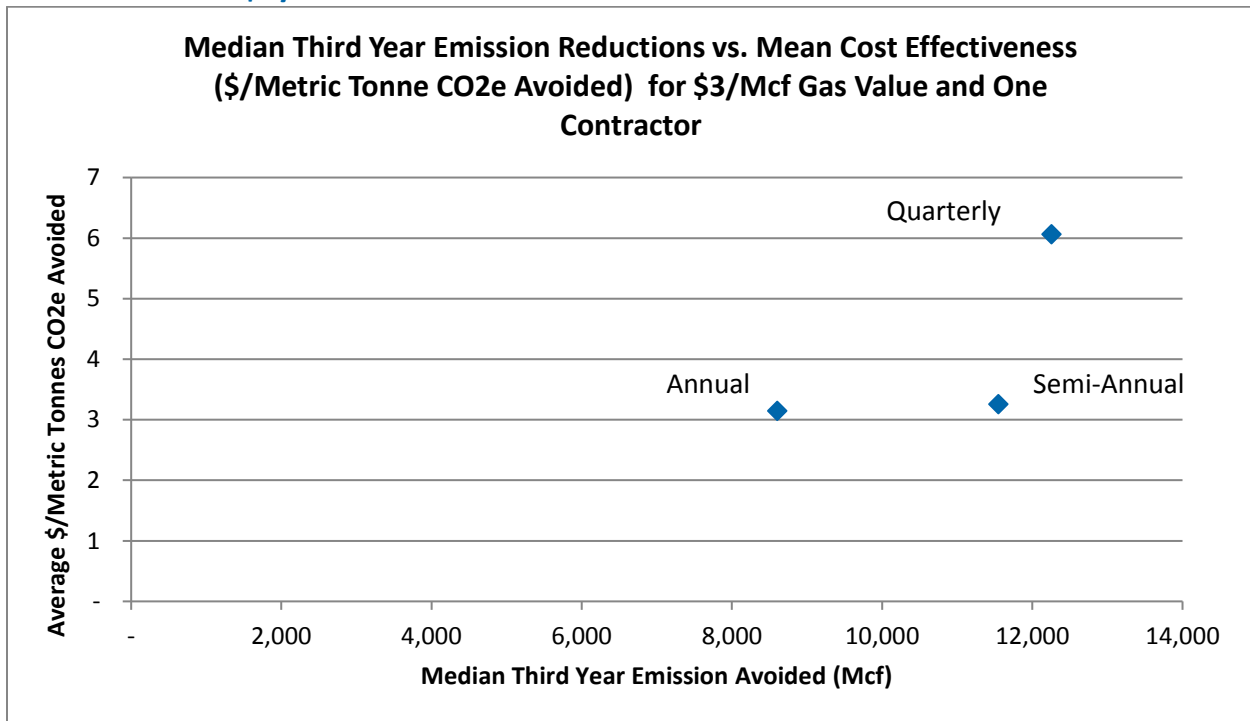


Figure 23: Processing Case 3 Cost Effectiveness

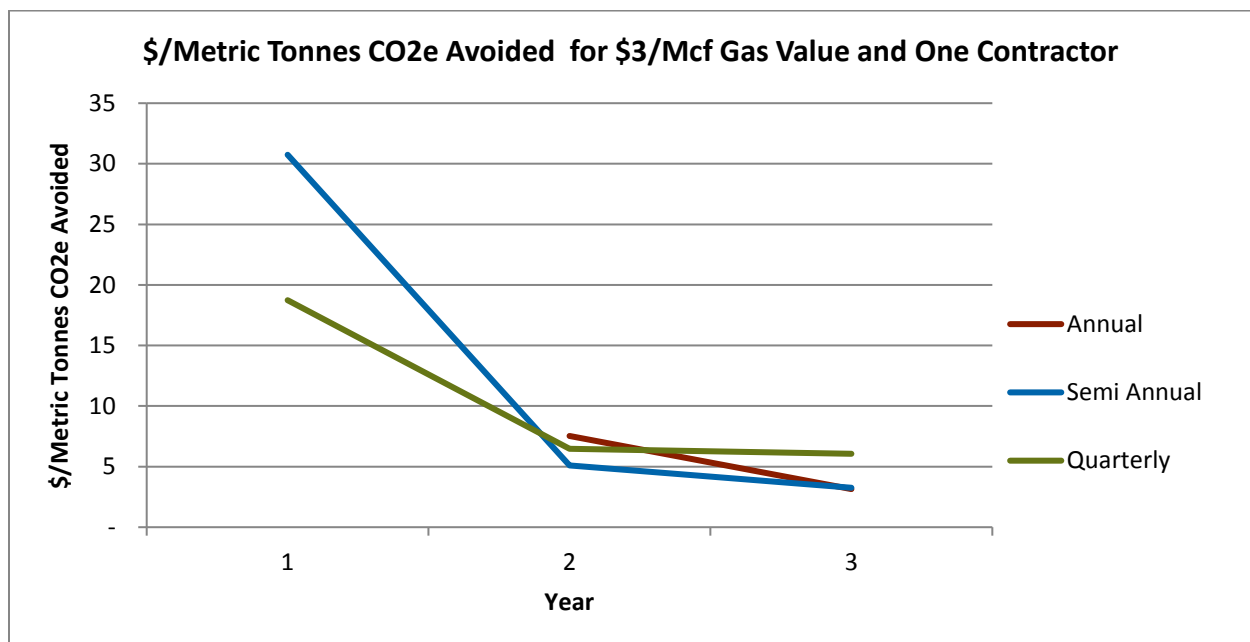


Figure 24: Processing Case 3 CO<sub>2</sub>e Avoided

#### A.3.4. Case 4 - \$0/Mcf Gas Value and Two Contractors

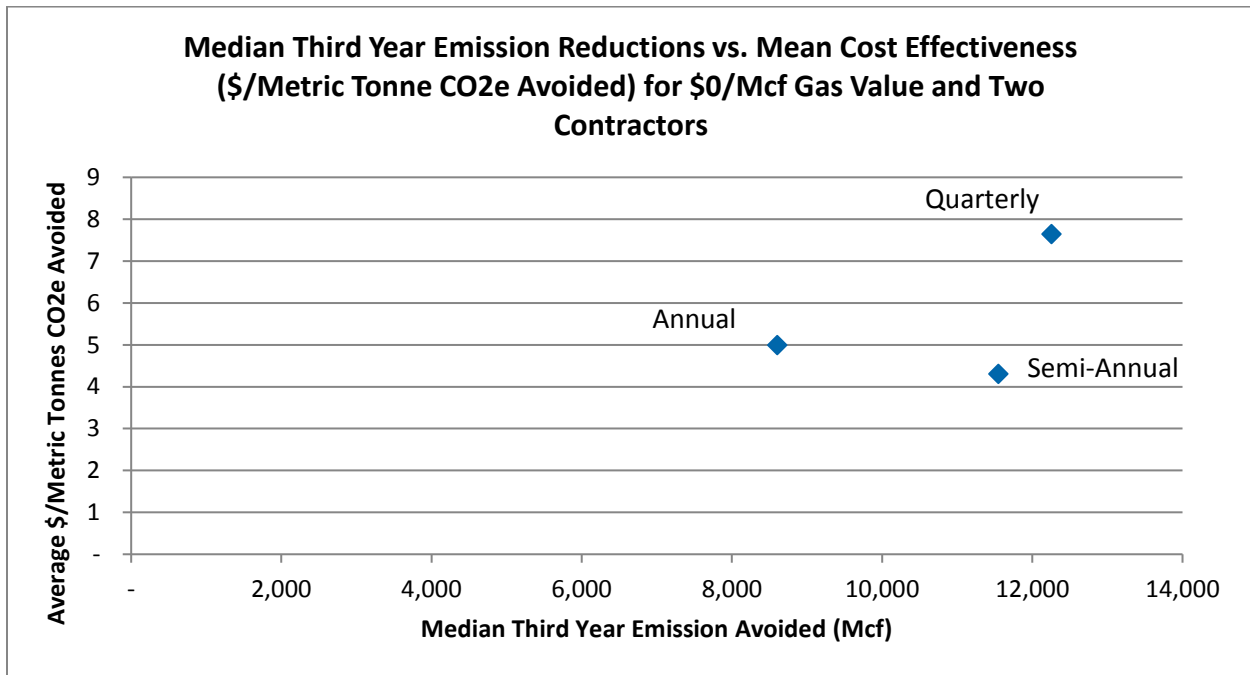


Figure 25: Processing Case 4 Cost Effectiveness

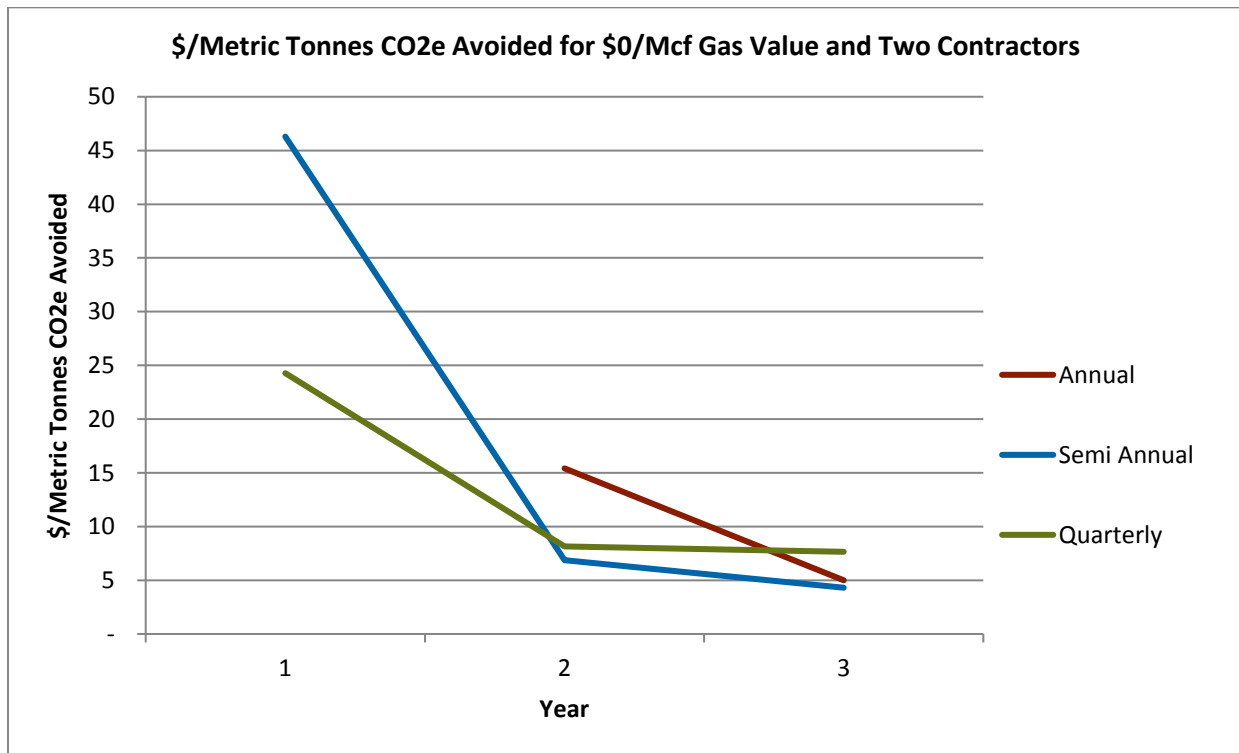


Figure 26: Processing Case 4 CO<sub>2</sub>e Avoided

### A.3.5. Case 5 - \$0/Mcf Gas Value and One Contractor

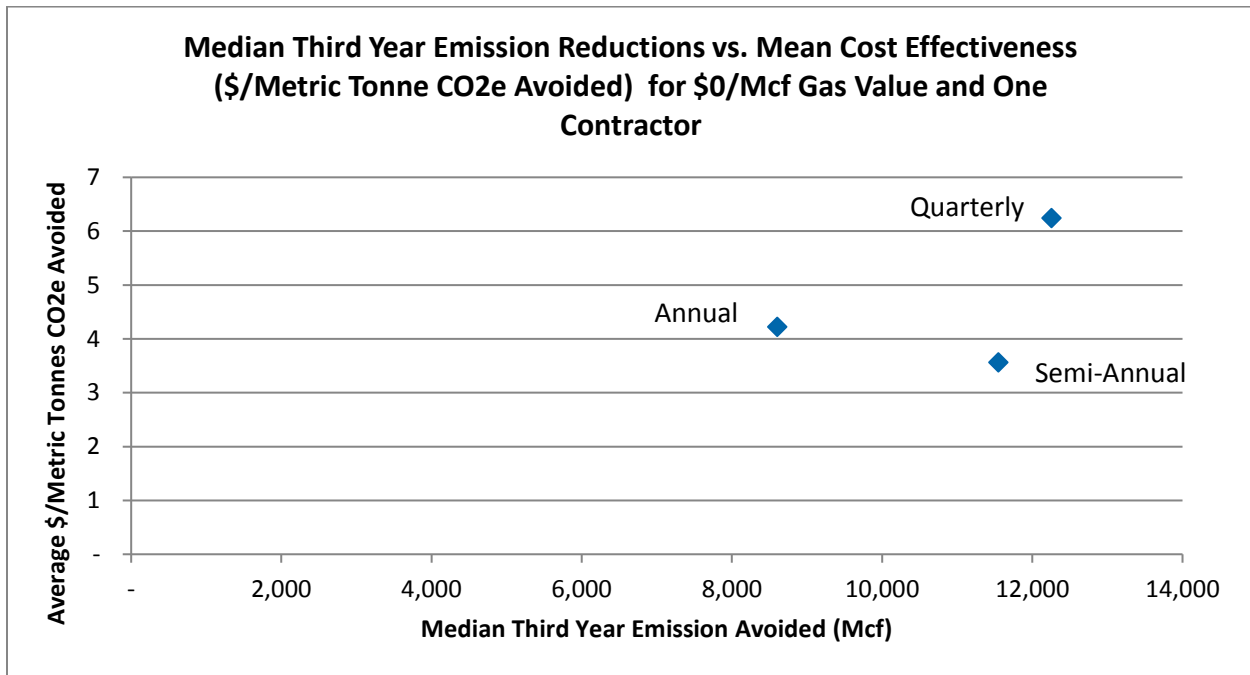


Figure 27: Processing Case 5 Cost Effectiveness

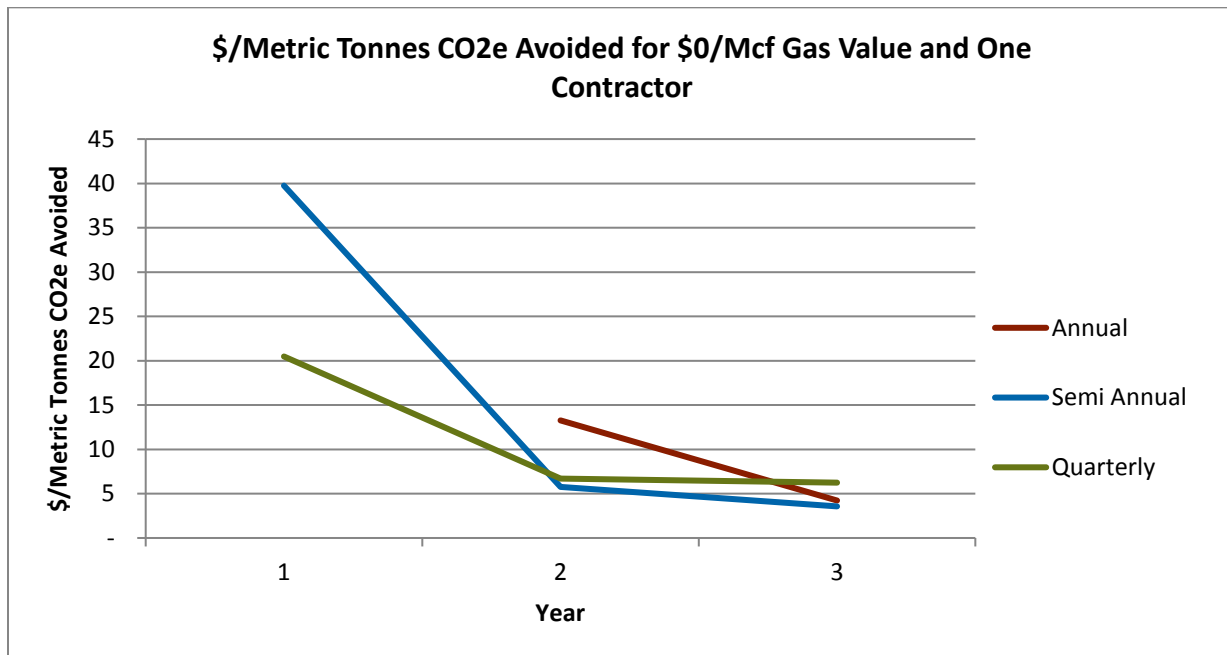


Figure 28: Processing Case 5 CO<sub>2</sub>e Avoided

## A.4. Storage

### A.4.1. Case 1 - \$3/Mcf Gas Value and Two Contractors

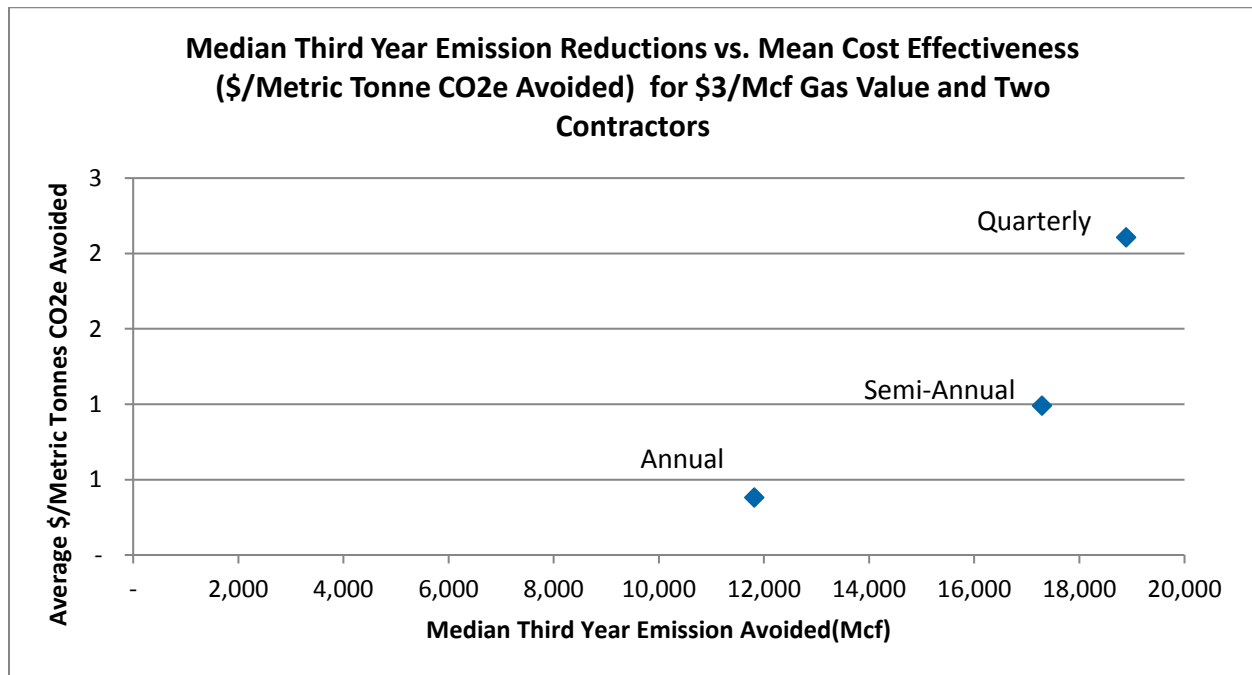


Figure 29: Storage Case 1 Cost Effectiveness

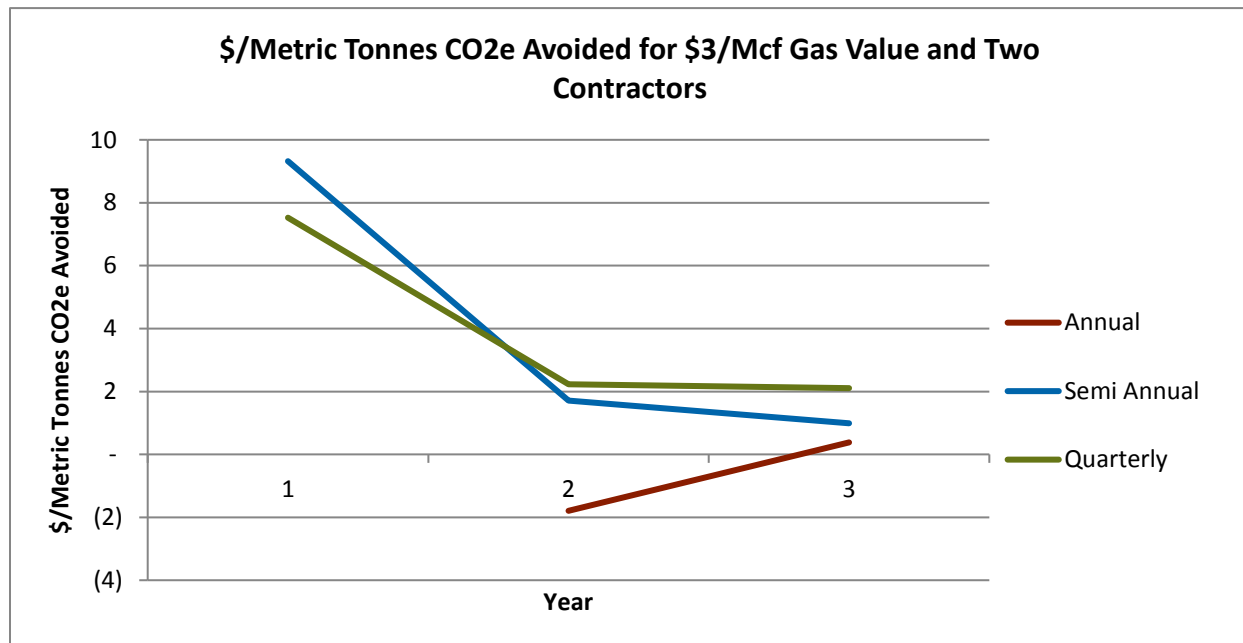


Figure 30: Storage Case 1 CO<sub>2</sub>e Avoided

#### A.4.2. Case 2 - \$4/Mcf Gas Value and Two Contractors

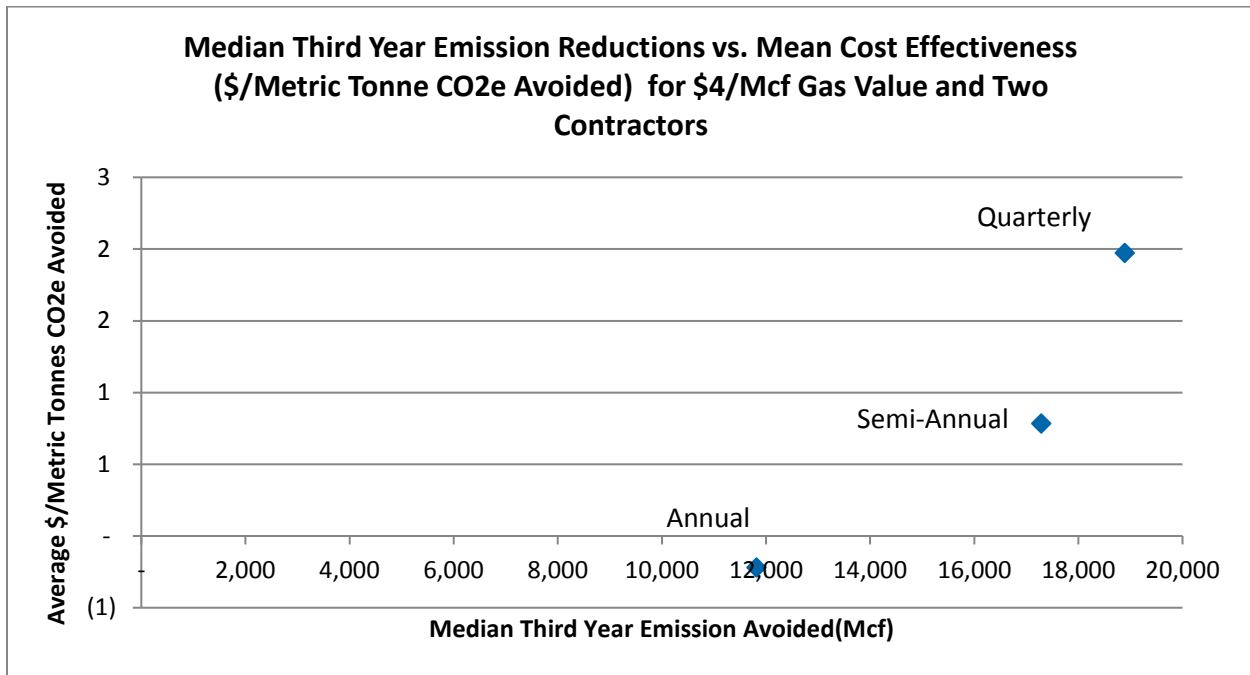


Figure 31: Storage Case 2 Cost Effectiveness

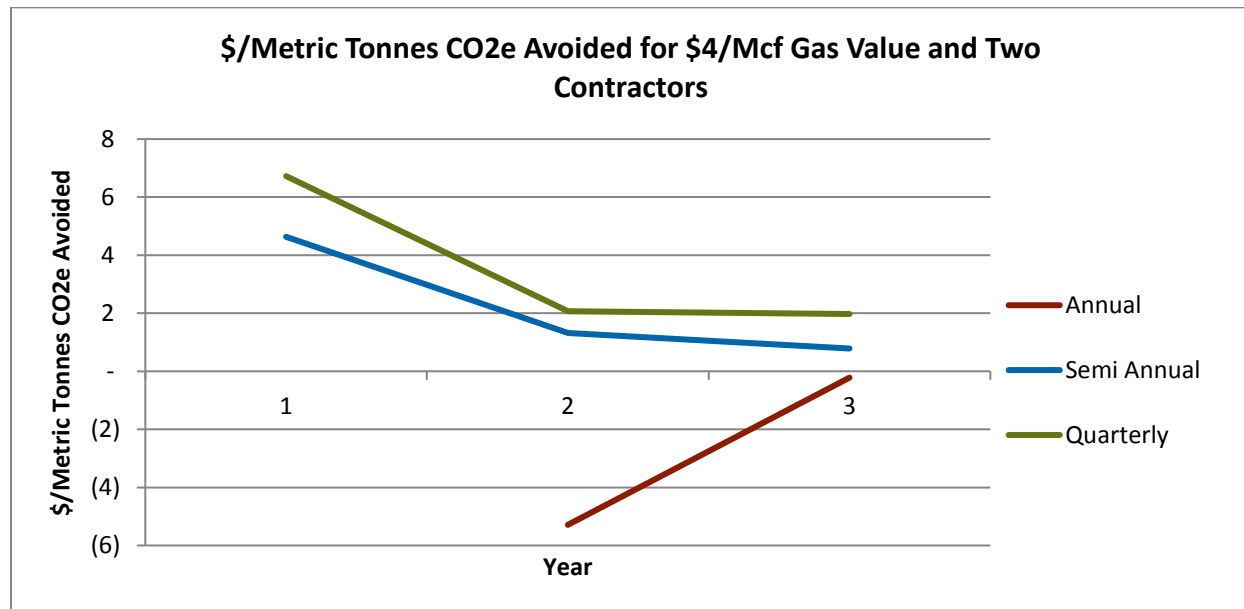


Figure 32: Storage Case 2 CO<sub>2</sub>e Avoided



#### A.4.3. Case 3 - \$3/Mcf Gas Value and One Contractor

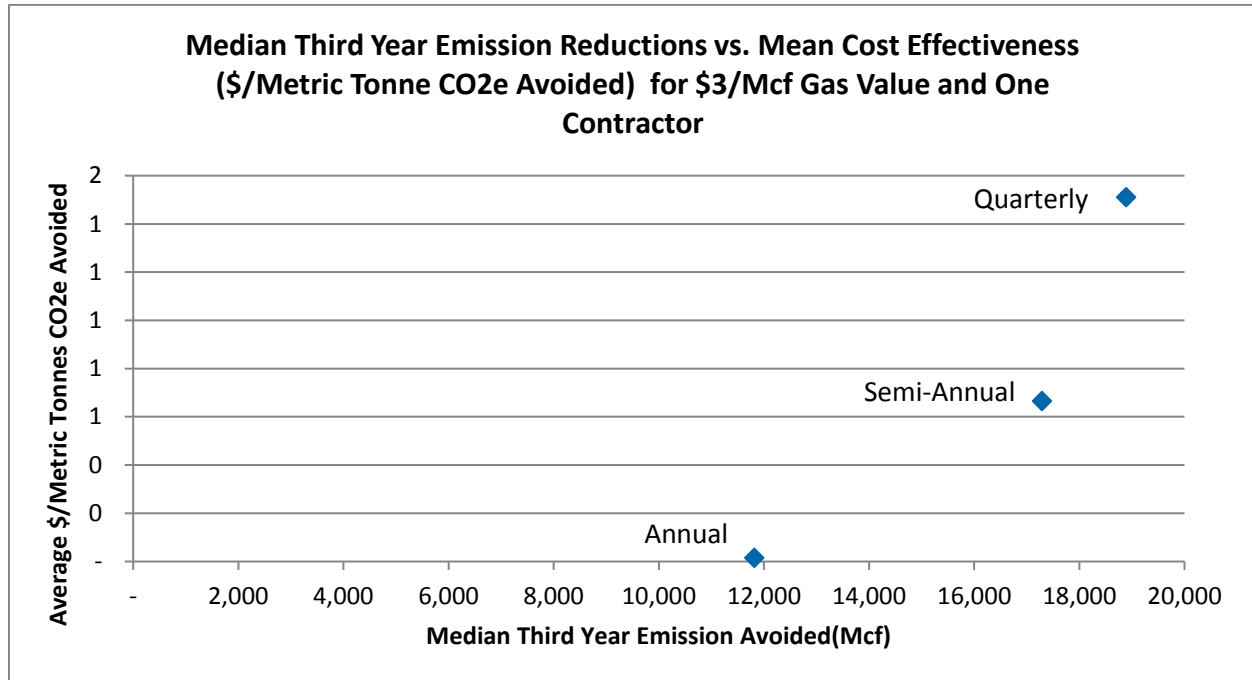


Figure 33: Storage Case 3 Cost Effectiveness

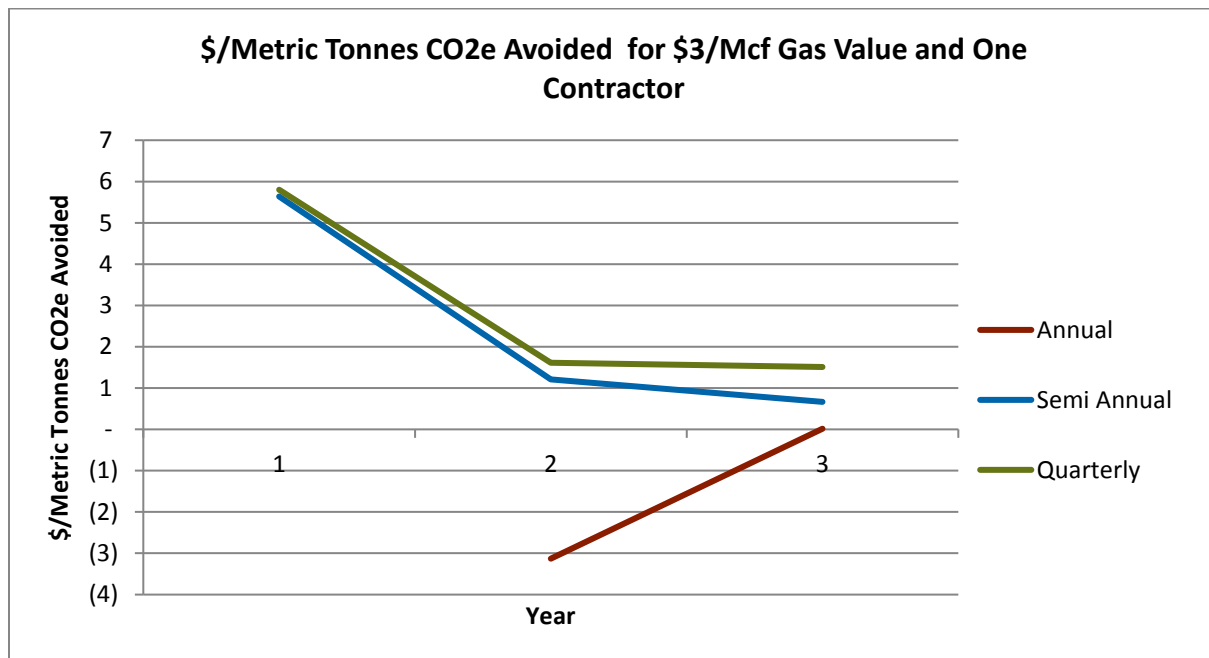


Figure 34: Storage Case 3 CO<sub>2</sub>e Avoided

#### A.4.4. Case 4 - \$0/Mcf Gas Value and Two Contractors

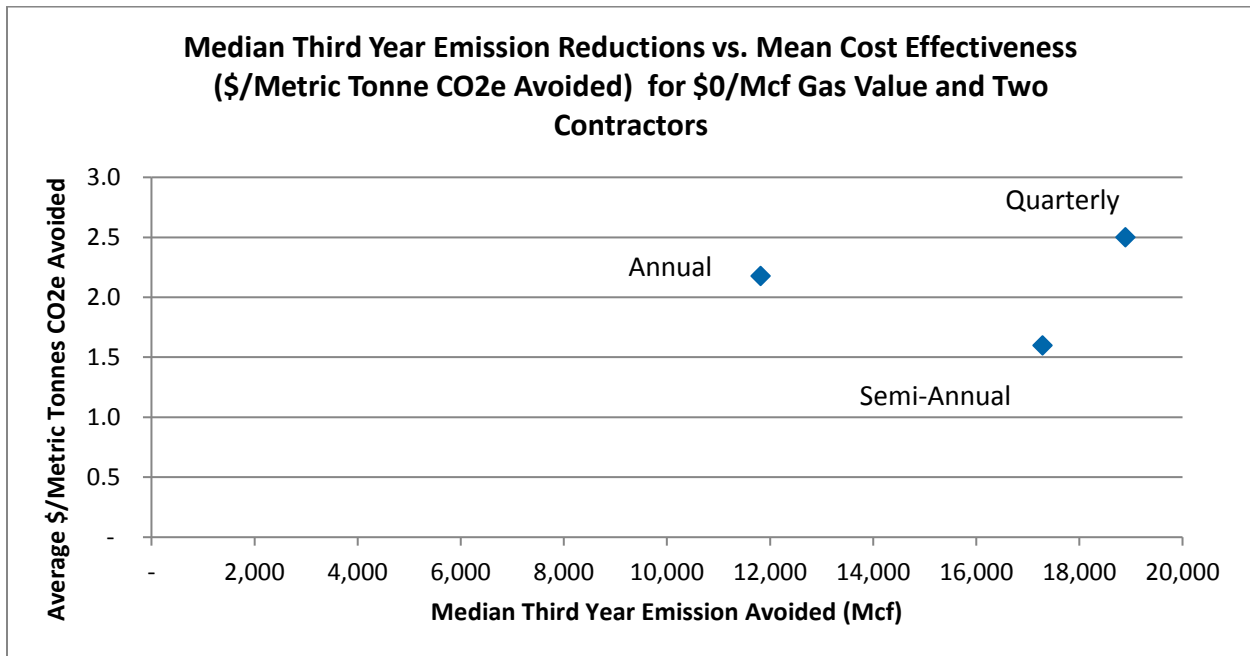


Figure 35: Storage Case 4 Cost Effectiveness

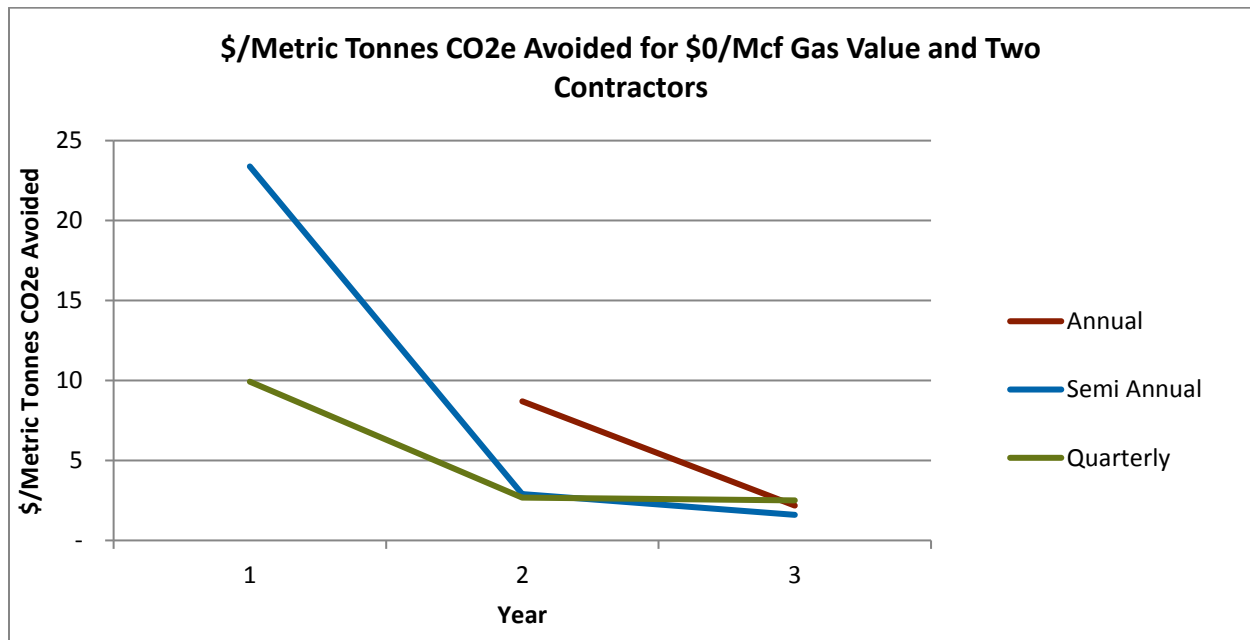


Figure 36: Storage Case 4 CO<sub>2</sub>e Avoided

#### A.4.5. Case 5 - \$0/Mcf Gas Value and One Contractor

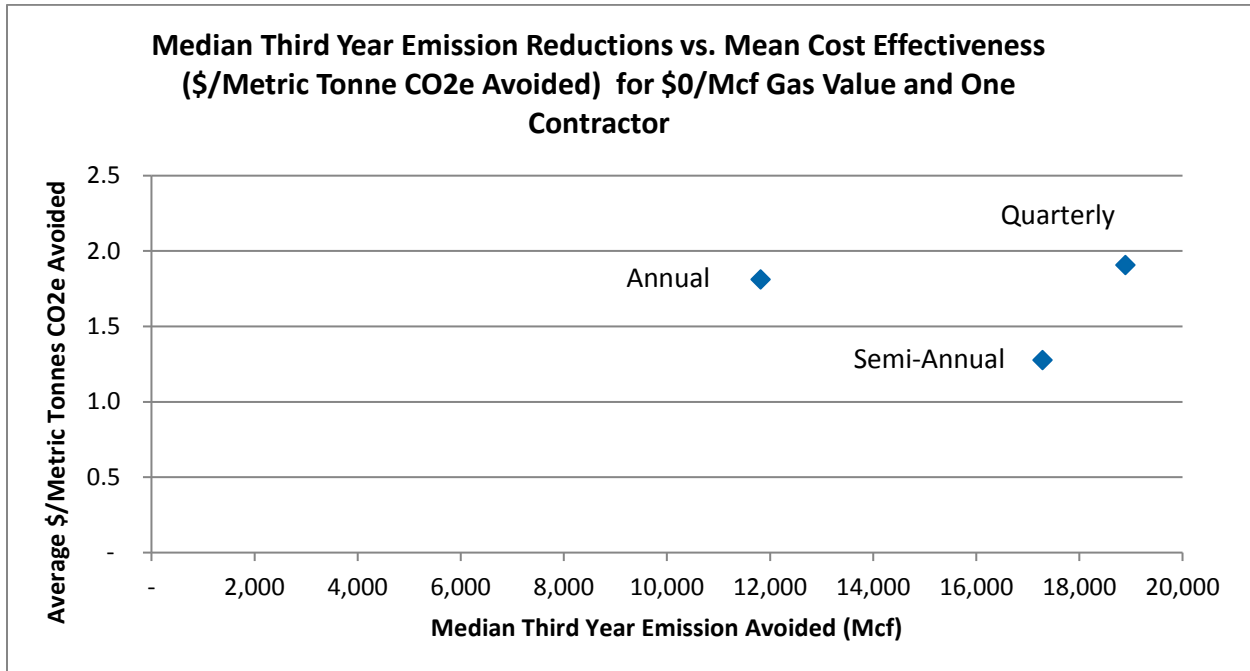


Figure 37: Storage Case 5 Cost Effectiveness

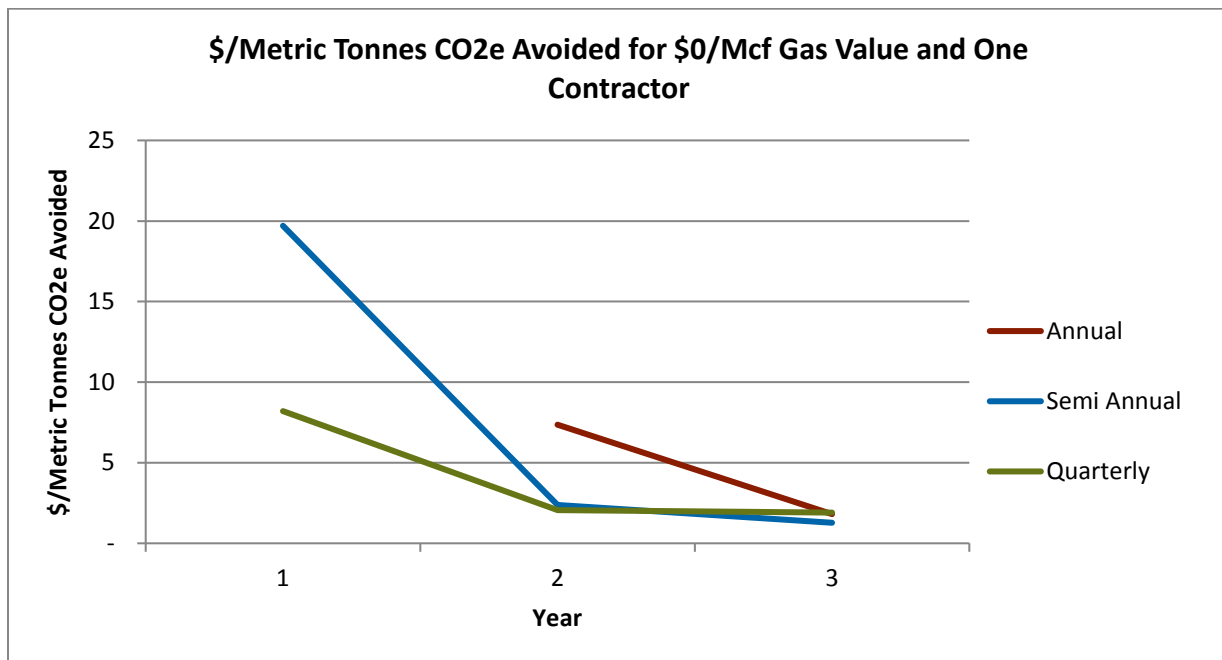


Figure 38: Storage Case 5 CO<sub>2</sub>e Avoided

## A.5. Gathering and Boosting

### A.5.1. Case 1 - \$3/Mcf Gas Value and Two Contractors

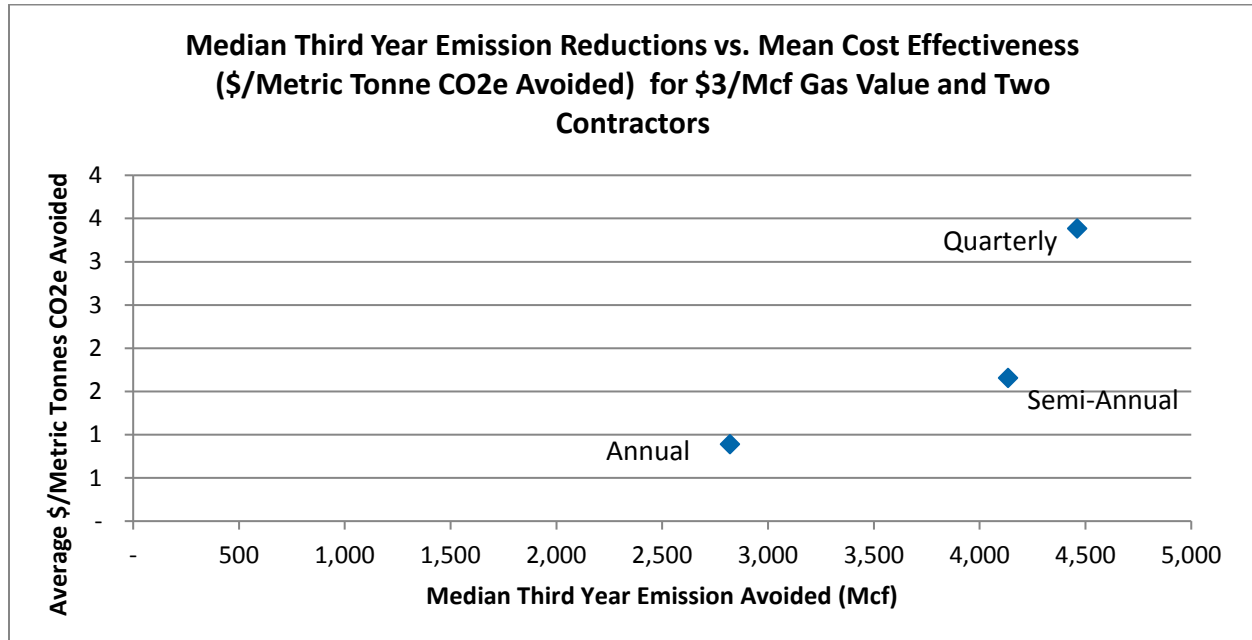


Figure 39: Gathering and Boosting Case 1 Cost Effectiveness

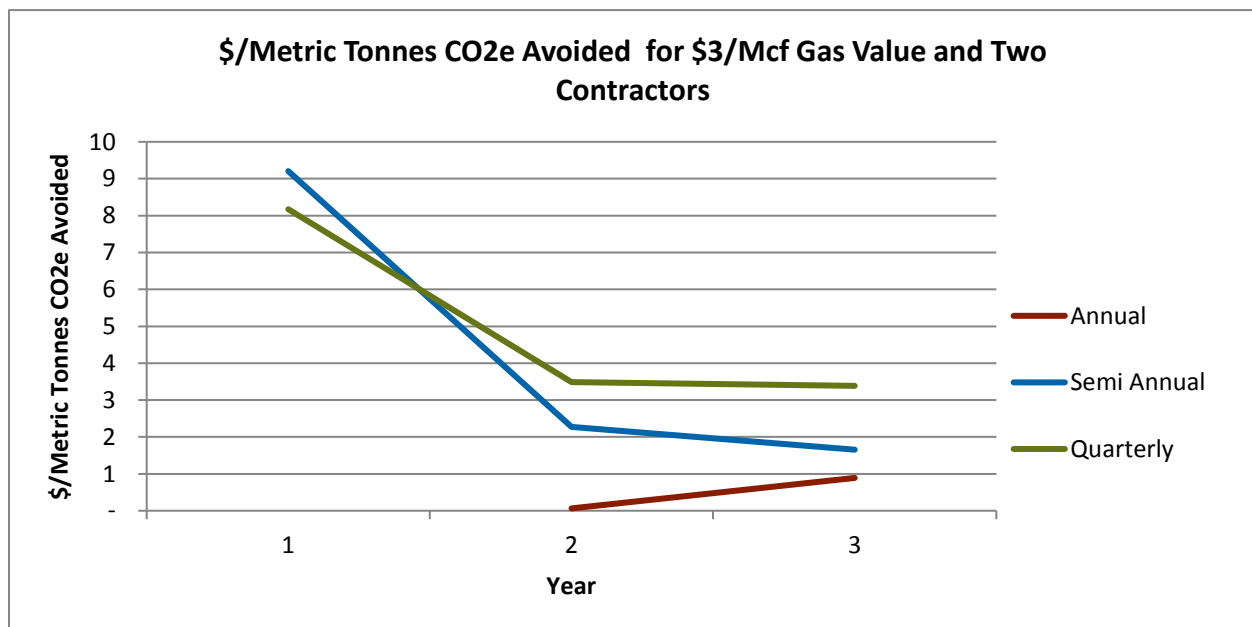


Figure 40: Gathering and Boosting Case 1 CO<sub>2</sub>e Avoided

### A.5.2. Case 2 - \$4/Mcf Gas Value and Two Contractors

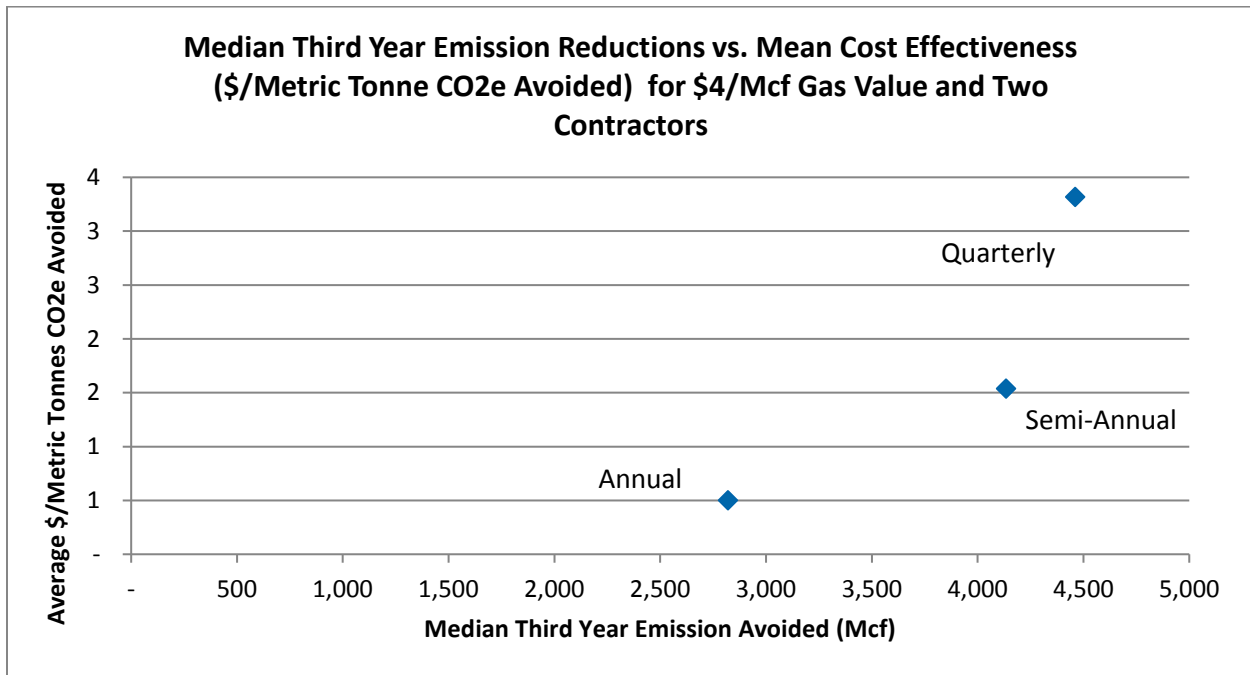


Figure 41: Gathering and Boosting Case 2 Cost Effectiveness

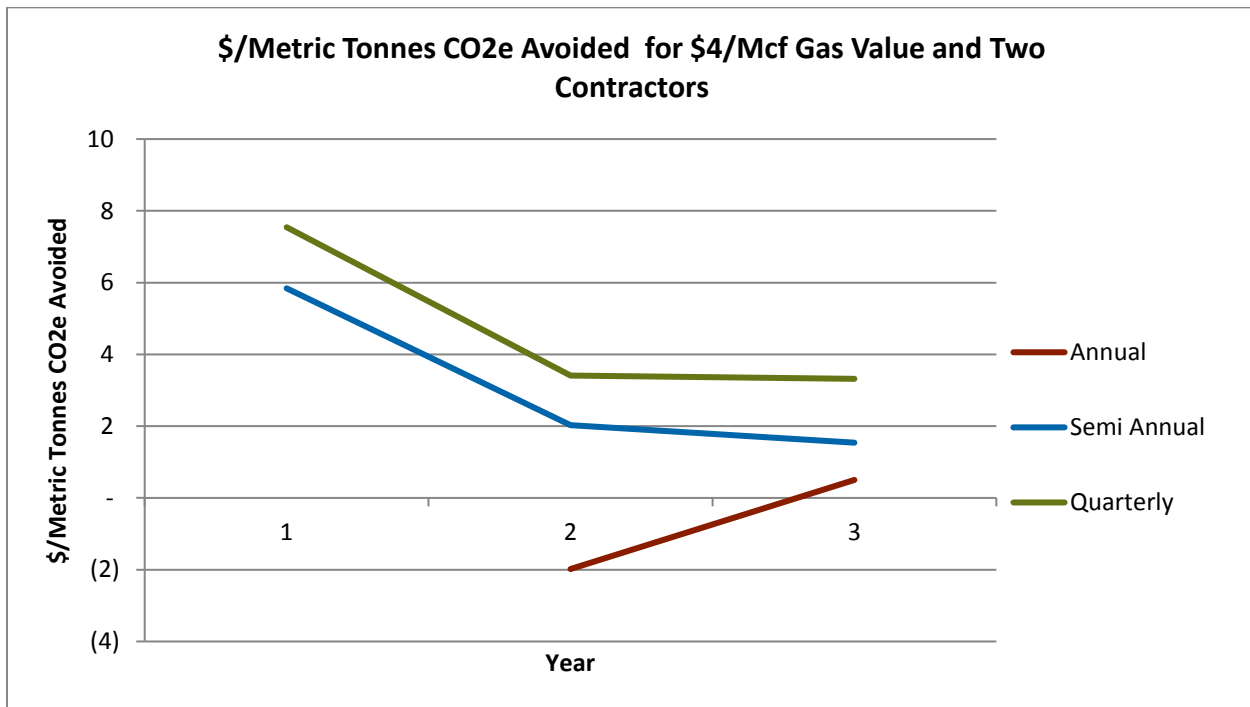


Figure 42: Gathering and Boosting Case 2 CO<sub>2</sub>e Avoided

### A.5.3. Case 3 - \$3/Mcf Gas Value and One Contractor

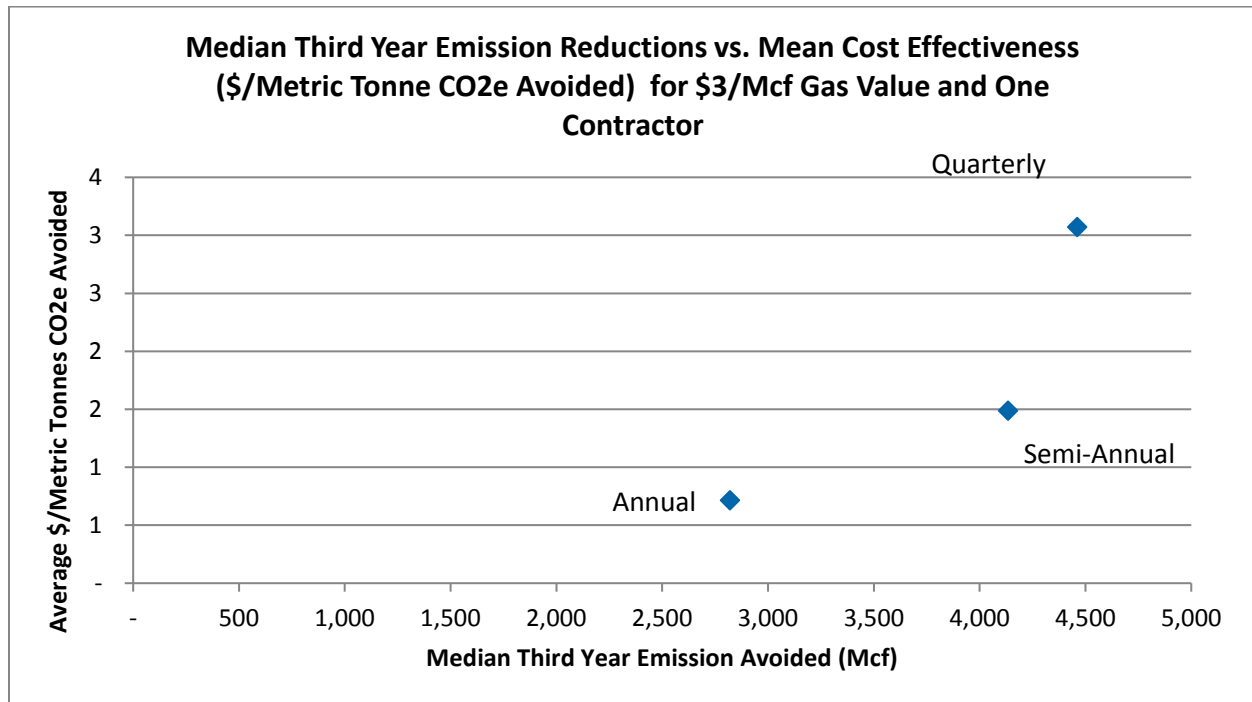


Figure 43: Gathering and Boosting Case 3 Cost Effectiveness

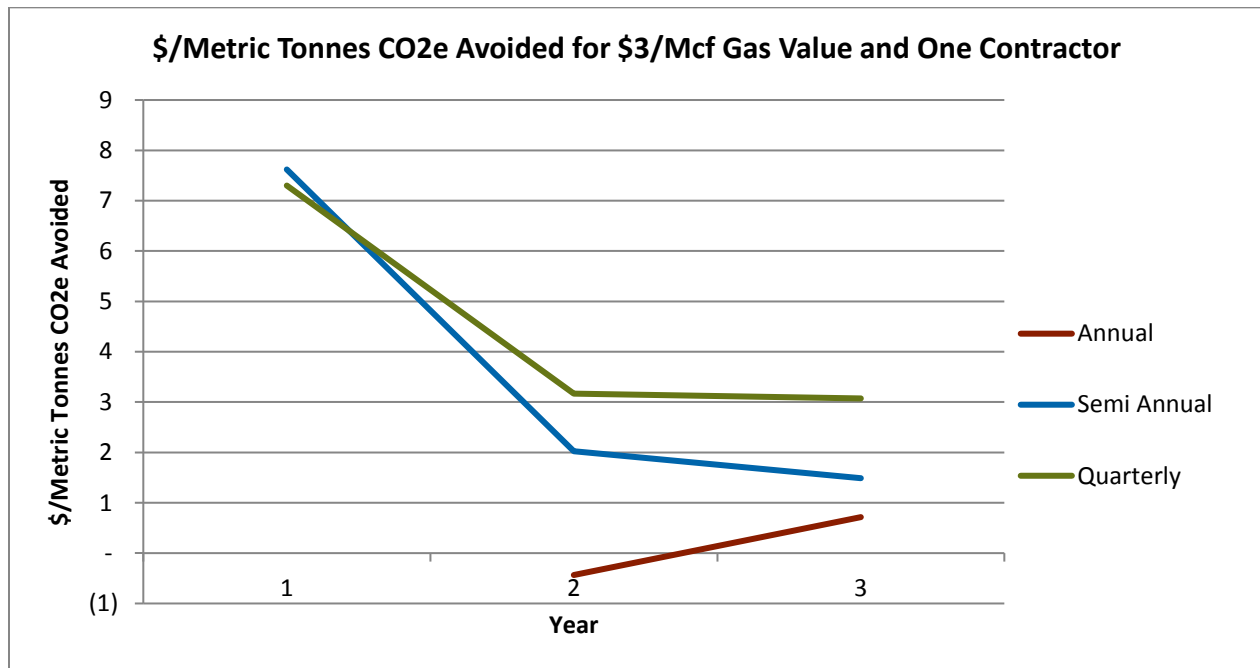


Figure 44: Gathering and Boosting Case 3 CO<sub>2</sub>e Avoided

COMMENTS FROM OVER 5,482 CANIFORNIANS IN SUPPORT OF  
THE CALIFORNIA AIR RESOURCES BOARD'S OIL AND GAS METHANE RULE

February 21, 2017

Elizabeth Scheehle, Chief  
Oil and Gas and Greenhouse Gas Mitigation Branch  
California Air Resources Board  
1001 "I" St. Sacramento, CA, 95814

**Subject: I strongly support California finalizing America's strongest methane rules**

Dear Ms. Scheehle,

Thank you for releasing a strong, final draft of methane regulations. I'm writing today to urge you to continue this crucial leadership by finalizing the strongest methane rules for oil and gas production in the country.

Smart policies that reduce methane and other harmful oil and gas pollutants are exactly what California needs. Once finalized and fully implemented, these standards will require oil and gas companies to find and fix leaky equipment. In doing so, they will not only help position California as a leader on climate change during a critical time for our country, they will also help improve health outcomes for Californians, especially those with asthma. And they will unleash new business opportunities across the state in leak detection and repair.

This is the right step for California, and for the country as a whole. Please finalize these standards as soon as possible.

Thank you,

- |   |   |
|---|---|
| 1. A Blanc, Forestville 95436-9813          | 14. Abigail Bates, Los Angeles 90034-6424         |
| 2. A J Averett, La Mesa 91942-5838          | 15. Abigail Wald, Los Angeles 90046-1924          |
| 3. A L, San Francisco 94112-4329            | 16. Achilles Aiken, Whittier 90601-2102           |
| 4. A Miller, Santa Monica 90404-2542        | 17. Adam Bernstein, Los Angeles 90012-2581        |
| 5. A Schwartz, Sebastopol 95472-2877        | 18. Adam Gockel, Irvine 92618-0116                |
| 6. A Vs, San Diego 92103-5716               | 19. Adam Kaplan, Laguna Beach 92651-1845          |
| 7. Aaron Gomez-Logan, Chico 95926-3807      | 20. Adam Nunez, Anaheim 92807-2236                |
| 8. Aaron Kirschenbaum, Lafayette 94549-2921 | 21. Adam Weiss, Van Nuys 91406-5817               |
| 9. Aaron Sachs, Oakland 94605-2138          | 22. Adele Gamble, Santa Rosa 95403-7928           |
| 10. Aaron Senegal, Richmond 94804-4934      | 23. Adele O'Neill, Stockton 95207-1701            |
| 11. Aaron Shaw, Los Angeles 90039-2114      | 24. Adeleadele Casdencasden, Calabasas 91302-3600 |
| 12. Aaron Zhang, San Diego 92129-2285       | 25. Adrian Frazier, Menifee 92585-8891            |
| 13. Abby Bateman, San Diego 92106-1518      | 26. Adrianne Borgia, Oakland 94609-1014           |

F-5-1

27. Adrienne Misdorp, Durban 4510
28. Adrienne Kovasi, Redding 96003-3452
29. Adrienne Lozoya, Portola Hills 92679-1229
30. Adrienne Muller, Ojai 93023-9303
31. Adrienne Simmons, Redding 96003-3452
32. Ahmed Ortiz, Sacramento 95818-2129
33. Aida Brenneis, Berkeley 94708-2126
34. Aidan Humrich, Rohnert Park 94928-3939
35. Aileen Smith, Temple City 91780-2556
36. Aimee Morein, Lomita 90717-3087
37. Aimee Morein, Long Beach 90813-2912
38. Aimee Pfohl, Davis 95616-0413
39. Aixa Fielder, Los Angeles 90016-1515
40. Aixa Fielder, Los Angeles 90028-5764
41. Akiko Tamano, San Diego 92129-3574
42. al m, azusa 91702
43. Al Novak & Andrea Graff, San Francisco 94131
44. Alaeddin Hakam, Berkeley 94707-2437
45. Alan Blackwell, San Diego 92130-3196
46. Alan Blumberg, Santa Cruz 95060-4214
47. Alan Cunningham, Carmel Valley 93924-9532
48. Alan Duran, Sacramento 95831-4423
49. Alan Klein, Citrus Heights 95621
50. Alan Liechty, Los Altos 94024-4909
51. alan mackillop, San Diego 92122-2602
52. Alan McDonald, Mt Baldy 91759-0562
53. Alan Nahum, La Jolla 92037-3013
54. Alan Rabinowitz, San Francisco 94114-1113
55. Alan Shindel, Berkeley 94702-1621
56. Alan Solomon, Palm Desert 92261-2195
57. Alan Yamamoto, Newhall 91321-2247
58. Alana Reynolds, Avila Beach 93424-0568
59. Albert Close, Hesperia 92345-2742
60. Albert Levy, Emeryville 94608-1649
61. Albert Robles, Napa 94558-5220
62. Alberto Acosta, Burbank 91505-3939
63. Alberto Arenas, Buena Park 90620-3534
64. Alberto Martinez, Sebastopol 95472-4568
65. Alec Taratula, Alhambra 91801-2079
66. Alejo Fabian, San Juan Capistrano 92675-1218
67. Alena Jorgensen, Temple City 91780-2235
68. Alessandra Molina, Los Angeles 90041-3347
69. alessandra richardson-beatty, san francisco 94114
70. Alessia Cowee, Chico 95973-0366
71. Alethea MacKinnon, Oakhurst 93644-9513
72. Alette Brooks, San Jose 95120-5526
73. Alette Brooks, San Jose 95160-0331
74. Alex Banh, San Jose 95148-2807
75. Alex Cole, Santa Barbara 93101-4942
76. Alex D, Valencia 91355-0961
77. Alex Dickson, Laguna Hills 92656-3160
78. Alex Faydo, Hemet 92545-7044
79. Alex Olmedo, Fullerton 92833-2747
80. Alex Pinigis, Berkeley 94703-1492
81. Alex Ruiz, Marina Del Rey 90292-6145
82. Alex Sheafe, Thousand Oaks 91361-5206
83. Alex Silverio, San Jose 95130-1251
84. Alexa Blatz, Marina Del Rey 90292-5322
85. Alexander Li, Camarillo 93012-7746
86. Alexander Yeung, Clovis 93619-3720
87. Alexandra Hopkins, La Crescenta 91214-3820
88. Alexandra Kinander, Encinitas 92024-1205
89. Alexandra Montijo, San Jose 95122-3639
90. Alexandra Simpson, Corona Del Mar 92625
91. Alexandra Weinberg, Burbank 91502-2401
92. Alexandre Kaluzhski, San Diego 92128-4276
93. Alexey Korzuchin, Dublin 94568-1050
94. Alexis Cohen, Sausalito 94965-1357
95. Alfa Santos, San Diego 92112-4998
96. Alfred Cellier, Rancho Palos Verdes 90275-6418
97. Alfred Long, Torrance 90503-3012
98. Alfred Yeager, San Diego 92110-3719
99. Alice Alford, Blythe 92226-2323
100. Alice Hendrix, Orangevale 95662-0142
101. Alice Howard, San Miguel 93451-9727
102. Alice King, Rio Vista 94571-9768
103. Alice Labay, Benicia 94510-2332
104. Alice Larsen, Sebastopol 95472-3555
105. Alice Lasky, Walnut Creek 94598-1041
106. Alice Polesky, San Francisco 94107-2644
107. Alice Sheehy, La Crescenta 91214-2037
108. Alice Simpson, Fulton 95439-8834
109. alice sutton, San Luis Obispo 93401-4132
110. Alice Weigel, Watsonville 95076-3067
111. Alicia Barela, Los Gatos 95032-4406
112. Alicia Gallagher, Benicia 94510-3443
113. Alicia Salazar, Los Angeles 90032-2236
114. Alisa Jenkin, Oak View 93022-9522
115. Alisa Silver, Sacramento 95831-4007
116. Alison Blume, Novato 94945-3205
117. alison buchter, Santa Cruz 95060-5149
118. Alison Chubb, Redwood City 94061-3208
119. Alison Dreyer, Burbank 91506
120. Alison Freeman, Los Angeles 90024-3018
121. Alison Markowitz Chan, San Francisco 94122
122. Alison Montera, San Diego 92128-4734
123. Alison Snow, Sierra Madre 91024-1112
124. Alissa Wyffels, Santa Monica 90403-2107
125. Aliza Rood, Los Angeles 90005-3018
126. Allan Campbell, San Jose 95132-1920
127. Allan Glick, San Diego 92128-2356
128. Allen Carroll, San Jose 95110-2249
129. Allen Leinwand, San Jose 95124-2037
130. Allen Peters, Hemet 92545-3427
131. Allen Royer, San Jose 95125-3114
132. Allie Jennings, Sonoma 95476-5913
133. Allie Palmer, san clemente 92672
134. allison bloom, Mill Valley 94941-2110
135. Allison Dimich, Los Angeles 90049-1944
136. Allison Grant, Westlake Village 91361-3513



137. Allison Moffett, Brea 92821-4939
138. Allison Navarro, San Jose 95127-5439
139. Alma Prins, Berkeley 94702-1618
140. Alta Lowe, San Francisco 94112-1007
141. Althea Kippes, San Francisco 94109-4221
142. Álvaro de Regil Castilla, Moorpark 93021-3111
143. Alwen Bauer, Palos Verdes Estates 90274-2006
144. alyce brown, San Francisco 94109-2281
145. Alys Hay, Windsor 95492-6890
146. Alyson Klier, Oceanside 92054
147. Alyx Karpowicz, Alameda 94501-3119
148. Amada A, San Francisco 94117-1215
149. Amanda Barber, Riverside 92505-4718
150. Amanda Barry, Del Mar 92014-3815
151. Amanda Blatchford, Walnut Creek 94598-4854
152. Amanda Glover, Venice 90291-3927
153. Amanda Heinrich, Goleta 93117-4345
154. Amanda Heske, Fullerton 92833-1262
155. Amanda Litwak, Mill Valley 94941-2524
156. Amanda Percy, Burbank 91506-3315
157. Amanda Perez, San Diego 92117-4023
158. Amanda Rosenberg, Oakland 94606-1535
159. Amanda Short, Sonoma 95476-7221
160. Amanda Zangara, Sebastopol 95472-3146
161. Amara Siva, San Diego 92128-3604
162. Amber Coverdale Sumrall, Soquel 95073-9778
163. Amber H, Newark 94560-8522
164. Amber Heard, San Diego 92107-2007
165. Amber Rehling, Santa Cruz 95060
166. Amber Schrupf, Redding 96003-4022
167. Amber Tidwell, Culver City 90230-5413
168. Amber Wheat, Redondo Beach 90278-2937
169. Amelia Clark, La Mesa 91941-5766
170. Amelia Jones, Santa Monica 90405-4303
171. Amy Agzarian, Culver City 90230-5443
172. Amy Christenson, Seaside 93955-5037
173. Amy Hill, Big Bear Lake 92315-7138
174. amy lanners, La Mesa 91941-7415
175. Amy Leroy, Santa Rosa 95403-2913
176. Amy Malina, Playa Vista 90094-2095
177. Amy Morse, Agoura Hills 91301-4021
178. Amy Pfaffman, San Geronimo 94963-0050
179. Amy Rivera, Encinitas 92024-2835
180. amy schadt, Los Angeles 90042-2359
181. amy shafer, Santa Monica 90402-3028
182. Amy Spencer, Grass Valley 95949-9041
183. Amy Wilson, San Mateo 94401-1213
184. Anahata Pomeroy, Ojai 93024-0320
185. Analee Guillen, Costa Mesa 92627
186. Anastasia Fiandaca, San Francisco 94131-2421
187. anastasia yovanopoulos, San Francisco 94114
188. Anaundda Elijah, San Luis Obispo 93401-7942
189. Andi Brittan, Los Angeles 90019-1604
190. Andre Calvin Jr, Lawndale 90260-1542
191. Andre Leon, Watsonville 95076-2532
192. Andre Pessis, Corte Madera 94925-1314
193. Andrea & James Gutman, Sunland 91040-1215
194. Andrea Bonnett, Altadena 91001-5074
195. Andrea Engelmann, Palm Springs 92264-8267
196. Andrea Fraser, Sherman Oaks 91423-4614
197. Andrea Gera, San Jose 95120-3008
198. Andrea Gross, Oceanside 92049-0084
199. Andrea Herold, Sebastopol 95472-9616
200. Andrea Hilario, La Puente 91744-4745
201. Andrea Hopkins, Monrovia 91016-1514
202. Andrea Iaderosa, Los Angeles 90027-4312
203. Andrea Kean, Berkeley 94708-2005
204. Andrea Rush, San Jose 95123-3609
205. andres romero suarez, Hermosa Beach 90254
206. Andrew Beaupre, Los Angeles 90028-4524
207. Andrew Creighton, Los Angeles 90032-2928
208. Andrew Crisp, San Rafael 94903-1433
209. Andrew Deniger, Castroville 95012-9731
210. Andrew Olsen, Los Angeles 90027-2758
211. Andrew Parratt, San Francisco 94114-2944
212. Andrew Royer, Shasta Lake 96019-9247
213. Andrew Stranahan, San Bruno 94066-1719
214. Andrew Tirrell, San Diego 92109-2002
215. Andrew Walcher, Del Mar 92014-3718
216. Andy Carman, Santa Cruz 95060-6335
217. Andy Cowitt, Oakland 94610-5107
218. Andy L, Irvine 92602-0733
219. Andy Lupenko, Lemon Grove 91945-2615
220. Andy Scott, Paso Robles 93446-4972
221. Angela Downey, San Diego 92109-4059
222. Angela Gantos, Tiburon 94920-2010
223. Angela Jenkins, Los Angeles 90019-2885
224. Angela LaPlante, Monte Sereno 95030-4219
225. Angela T Cannavo, Sunnyvale 94089-5511
226. Angelica Mares, Chino 91710-3451
227. Angelina SAUCEDO, Montebello 90640-6432
228. Angelo Simao, Chico 95928-6580
229. Animae Chi, Ojai 93023
230. Anita Coolidge, Cardiff 92007-1043
231. Anita Eliot, Santa Rosa 95409-4118
232. Anita Grant, Santa Rosa 95401-5601
233. Anita Knight, Del Mar 92014-2732
234. Anita Thomason, Culver City 90230-4943
235. Anjanette George, Menifee 92584-7378
236. Anje' Waters, Grass Valley 95945-7804
237. Ann Alexander, Santa Rosa 95409-5825
238. Ann Bein, Los Angeles 90064-2026
239. Ann Bjorklund, Los Altos Hills 94022-4609
240. Ann Gould Massoubre, Los Osos 93402-2405
241. Ann Griffith, Orinda 94563-2045
242. Ann Grow, Chula Vista 91910-1822
243. Ann Houghtby, Red Bluff 96080-0754
244. Ann M Rockwell, Berkeley 94707-2024
245. Ann Marie Morris, Palos Verdes, 90275-4453
246. Ann Moureau, Desert Hot Springs 92240-2100

247. Ann Nore, San Francisco 94110-2596
248. Ann Olsborg, Santa Rosa 95404-2054
249. Ann Rrennacker, Fort Bragg 95437-4124
250. Ann Schieding, River Pines 95675-0280
251. Ann Stratten, La Mesa 91941-7325
252. Ann Tait, Pasadena 91104-5030
253. Ann Thryft, Boulder Creek 95006-9341
254. Ann Tubbs, San Francisco 94105-3111
255. Ann Zald, Sherman Oaks 91403-4131
256. Anna Bainter, Jamul 91935-7826
257. Anna Hamann, San Diego 92105-1207
258. Anna Harrison, View Park 90043-1634
259. Anna Pedotti, Santa Barbara 93101-1522
260. Anna Schofield, Los Angeles 90024-4838
261. Anna Steffen, Long Beach 90808-2833
262. Anna Utzman, Mill Valley 94941-5032
263. Anne Baldeshwiler, San Diego 92128-1076
264. Anne Barker, San Rafael 94901-3904
265. Anne Calderwood, Murphys 95247-2244
266. Anne Danberg, San Rafael 94901-2638
267. Anne Dugaw, Costa Mesa 92627-3207
268. Anne Edwards, Los Angeles 90071-2901
269. Anne Gregory, Palo Alto 94303
270. Anne Grim, Murrieta 92562-3508
271. Anne Gross, Modesto 95351-4920
272. Anne Harvey, San Diego 92130-2609
273. Anne Hayes, San Diego 92108-1850
274. Anne Huber, Los Gatos 95032-3805
275. Anne Kobayashi, San Diego 92122-5630
276. Anne Lakota, Mill Valley 94941-1516
277. Anne Lebas, San Rafael 94903-2571
278. Anne Munitz, Santa Monica 90402-2921
279. Anne Muraski, Monterey 93940-2006
280. Anne Parzick, Corona Del Mar 92625-1324
281. Anne Smith, Carlsbad 92010-7901
282. anne veraldi, San Francisco 94110-1688
283. Anne-Christine Strugnell, San Rafael 94903-3722
284. Anne-Lise Francois, Berkeley 94708-1821
285. Annette Amey, Berkeley 94708-1634
286. Annette Benton, Antioch 94509-7032
287. Annette Cadosi-Wilson, Healdsburg 95448-9131
288. Annette Ehrlich, Los Angeles 90068-3376
289. Annette Mello, Boulder Creek 95006-9075
290. Annette Paluska, Long Beach 90803-5176
291. Annette Raible, Petaluma 94952-9687
292. Annie Masullo, San Francisco 94114-3361
293. Annie Mladnich, San Leandro 94577-2941
294. Annie Stuart, Petaluma 94952-1008
295. Annie Watanabe-Rocco, Los Angeles 90095-0001
296. Annika Backstrom, Eureka 95501-3371
297. anny anny, Thousand Oaks 91360-2066
298. Anthony Arn, West Hollywood 90069-4383
299. Anthony Castillo, Long Beach 90805-3016
300. Anthony Chico, Duarte 91010-2641
301. anthony oliveria, Elk Grove 95624-3005
302. Anthony Shogren, Los Angeles 90031-3284
303. Anthony Stratton, Elk Grove 95624-2125
304. Antoinette Levine, Ojai 93023-1903
305. Antoinette Wrubel, Half Moon Bay 94019-2221
306. Antonia Conway, Los Gatos 95032-3608
307. Antonia Robertson, Santa Barbara 93108-1633
308. Antonio Carmo, San Marcos 92078-5434
309. Antonio Grijalva, Los Angeles 90068-1438
310. April Barnett, Los Angeles 90019-2922
311. April Hejka-Ekins, Turlock 95380-4740
312. Apryl Mefford-Hemauer, Santa Monica 90405
313. Arbella Parrot, Mill Valley 94941-3930
314. Ardath Lee, Santa Rosa 95405-6646
315. Ariana Newcomer, Los Gatos 95033-8050
316. Ariana Ortiz, Hayward 94541-5424
317. Ariane Beck-Manning, Campbell 95008-0729
318. Ariel White, Valley Village 91607-1443
319. Arin Frankhouse, San Bruno 94066-1847
320. Arin Keshishian, Glendale 91206-2252
321. Arleen Zuniga, Guerneville 95446-8937
322. Arlene Baker, Berkeley 94704-2848
323. Arlene Fisher, Oakland 94605-5834
324. Arlene Hester, Camarillo 93010-2241
325. Arlene Kara, Fairfax 94930-2118
326. Arlene Mendibles, Sacramento 95811-1002
327. arlene nilsson, Los Angeles 90034-5393
328. Arlene Smith, Julian 92036-2412
329. Arlette Towner, La Crescenta 91214-4310
330. Arlyn Marroquin, Van Nuys 91405-1822
331. Armand Neukermans, Portola Vally 94028-8019
332. armeda tafel, Los Angeles 90045-2954
333. Arnaud DUNOYER, Venice 90291-3836
334. Arne Emerson, Santa Monica 90403-5300
335. Arno Safarian, Canoga Park 91304-3661
336. arnold johnson, Los Angeles 90017-1908
337. Art Perez, San Leandro 94578-3908
338. Art Vankampen, Pasadena 91104-2249
339. Arthur Chan, Concord 94518-1646
340. Arthur Connor, Idyllwild 92549-3317
341. Arthur Delgadillo, Lakewood 90715-1415
342. Arthur Gregorian, Oakland 94602-1628
343. Arthur Krakowsky, Livermore 94550-9615
344. Arthur Peill, Solana Beach 92075-2497
345. Arthur Squillante, Castro Valley 94546-4369
346. Arthur Ungar, Lafayette 94549-5725
347. Aryae Katchen, Potrero 91963-0470
348. Asha Sidhu, Oceanside 92057-6147
349. Asher Cohen, Los Altos 94024-7214
350. Ashlee Johnson, Simi Valley 93063-3825
351. Ashley Lewis, Fairfax 94930-2036
352. Ashley Namasondhi, Los Angeles 90004-1411
353. Ashley Sarratt, Burbank 91504-3682
354. Ashni J Akand Karan, Pleasanton 94566-3433
355. aspyn burns, San Diego 92119-3040
356. Astrid Giese-Zimmer, Berkeley 94705-2424

357. Astrid Preston, Santa Monica 90403-2340
358. Atwell, Burbank 91506-1913
359. Aubrie Williams, San Diego 92106-1056
360. Audrey Doocy, Pacific Grove 93950-4218
361. Audrey Haynes, Berkeley 94710-2131
362. Austen Wiannecki-Wang, Santa Ana 92706-1614
363. Autumn Scott, Escondido 92026-6136
364. Ava Bhavsar, San Diego 92116-2353
365. Avi Greene, Indio 92203-4419
366. Avry Budka, Tujunga 91042-1302
367. Aydan Demiralp, Irvine 92612-1728
368. B Chan, San Diego 92131-2430
369. B gauler, Riverside 92506-3121
370. B Leightling, La Jolla 92037-5024
371. B Lerner, San Jose 95125-5524
372. B Milton, Shingle Spgs 95682-9803
373. B Vestal, Petaluma 94954-5864
374. B. E. , Westlake Village 91361-4500
375. Bahar Fazeli, Northridge 91324-1014
376. Ballinger Kemp, Richmond 94804-7494
377. barb kaye, Albany 94706-2013
378. Barb Miller, Camarillo 93012-6704
379. Barbara Ardrey, San Jose 95131-2787
380. Barbara Bell, San Luis Obispo 93405-1084
381. Barbara Bellin, Los Angeles 90045-6913
382. Barbara Beno, Hercules 94547-2087
383. Barbara Bettencourt, San Jose 95124-4846
384. Barbara Bills, Placerville 95667-4712
385. Barbara Burgess, Napa 94559-4441
386. Barbara Burr, Davis 95616-1906
387. Barbara Byrne, San Francisco 94121-3523
388. Barbara Caretto, West Hills 91304-6107
389. Barbara Carter, Sonoma 95476-6800
390. Barbara Chudilowsky, Pacific Grove 93950-3604
391. Barbara Cohn, Carlsbad 92010-7072
392. Barbara Consbruck, Sylmar 91342-5150
393. Barbara Danese, Placerville 95667-5601
394. Barbara Daniels, Newbury Park 91320-5022
395. Barbara Dean, Grass Valley 95945-5684
396. Barbara Diane Noren, Campbell 95008-3737
397. Barbara Diederichs, Poway 92064-5832
398. Barbara Doll, Milpitas 95035-4769
399. Barbara Dover, Brentwood 94513-6953
400. Barbara Drosman, Encinitas 92024-7236
401. Barbara Finch, Santa Barbara 93111-1818
402. Barbara Frazer, Sacramento 95816-3937
403. barbara gale, Tarzana 91356-4313
404. Barbara Gladfelter, Dixon 95620-3627
405. Barbara Goldstein, Los Angeles 90064-3824
406. Barbara Greer, Davis 95618-5424
407. Barbara Greer, Esparto 95627-0786
408. Barbara Hardwick, Redondo Beach 90277-6604
409. Barbara Heneveld, Templeton 93465-8476
410. Barbara Hollenbach, Lafayette 94549-5524
411. Barbara Judd, Berkeley 94703-2371
412. Barbara Keating, Blue Lake 95525-0828
413. Barbara Kiernan, Olivehurst 95961-9370
414. Barbara King, Los Angeles 90029-0448
415. Barbara Krahm, Santa Barbara 93111-2539
416. Barbara Lamb, Oakland 94610-3365
417. Barbara Lawson, Calimesa 92320-1529
418. BARBARA MAJOY, MDR 90292-9247
419. Barbara Mauk, Hyampom 96046-0153
420. Barbara Miller, Covina 91723-3610
421. Barbara Mintz, Encinitas 92024-3642
422. Barbara Murray, Los Angeles 90041-2425
423. Barbara Murray, Santa Cruz 95060-9622
424. Barbara Nogal, San Diego 92130-1027
425. Barbara Patinkin, San Francisco 94109-3715
426. Barbara Pietrowiak, Dublin 94568-7274
427. Barbara Price, Menlo Park 94025-2302
428. Barbara Rose, Fremont 94536-4130
429. Barbara Schenk, Beverly Hills 90212-4402
430. barbara sharma, Los Angeles 90029-0125
431. Barbara Small, Fortuna 95540
432. Barbara Small, Fortuna 95540-3646
433. Barbara Stannard, Sacramento 95835-1238
434. Barbara Towner, Oakland 94605-1149
435. Barbara Trees, Tujunga 91042-2036
436. Barbara Whyman, Ventura 93001-2064
437. Barbi Buckles, truckee 96161
438. Barranca Wren, Vallecito 95251-0122
439. Barri Baas, Long Beach 90807-4415
440. Barrie Newell, Manhattan Beach 90266-4047
441. Barrie Stebbings, Stinson Beach 94970-0449
442. Barry Drake, Montrose 91020-1639
443. Barry Erbsen, Studio City 91604-3107
444. Barry Fass-Holmes, San Diego 92108-1800
445. Barry Saltzman, Los Angeles 90035-3946
446. barry weinzveg, Petaluma 94952-9735
447. Barry Zakar, Benicia 94510-0422
448. Bart Levenson, Hidden Valley Lake 95467-8794
449. Barvara Grant, Aptos 95003-9556
450. baudouin debrabandere, Santa Cruz 95062-1861
451. beate dirschl, Mount Shasta 96067-9416
452. Beatrice Battier, Oak View 93022-9528
453. Beatrice Nelson, Hayward 94541-1024
454. Beatrix Schramm, San Diego 92109-5491
455. Beatriz Beltran, Fremont 94555-2524
456. Beatriz Campal, San Jose 95130-2048
457. Beatriz Pallanes, Santa Ana 92704-3131
458. Becky Ryan, MI WUK VILLAGE 95346
459. Belinda Poropudas, San Rafael 94901-3650
460. ben baxter, Running Springs 92382-3243
461. Ben Hauck, El Segundo 90245-3905
462. Ben Martin, Truckee 96161-5031
463. Benita Riveroll, San Diego 92105-4828
464. Benjamin Bingaman, San Jose 95138-2600
465. Benjamin Etgen, Sacramento 95821-3128
466. Benjamin Hunter, Sacramento 95834-1053

467. Benjamin Irwin, Palo Alto 94306-2648
468. Benjamin Patnoi, Pasadena 91104-2421
469. Beri Pezzner, Hawthorne 90250-6340
470. Bernadette Foti, Paso Robles 93446
471. bernard hochendoner, Patterson 95363-8307
472. Bert Greenberg, San Jose 95135-1428
473. Berta Speisman, Laguna Woods 92637-8837
474. Beth Anderson, Arroyo Grande 93420-1808
475. Beth Giansiracusa, San Jose 95124-4912
476. Beth Herndobler, Altadena 91001-4209
477. Beth Purrinson, Sacramento 95821
478. Bethanie Gilbert, San Rafael 94903-2802
479. Bethany Schulze, Marina 93933-5001
480. Betsey Da Silva, Brisbane 94005-1702
481. Betsy Brown, San Francisco 94118-1320
482. Betsy Darr, San Francisco 94121-1216
483. Betsy Marstall, Half Moon Bay 94019-2320
484. Betsy Morrow, Monrovia 91016-5424
485. Betsy Walters, Gardena 90248-3602
486. Bette Byers, Santa Maria 93455-4182
487. betty baker, Lincoln 95648-8158
488. Betty Byrnes, Castaic 91384-3163
489. Betty Hamm, Hesperia 92345-5438
490. Betty Hatch, Santa Barbara 93110-2250
491. Betty Kissilove, San Francisco 94122-3644
492. Bev Kelly, Long Beach 90803
493. Bev Kelly, Long Beach 90803-3515
494. Beverly Allphin, Berkeley 94703-1909
495. Beverly Harris, Red Bluff 96080-3729
496. Beverly Kjer, Chula Vista 91911-5233
497. Beverly Kuck, Bakersfield 93306-7489
498. Beverly Magid, Sherman Oaks 91423-2362
499. Beverly Pena, Tiburon 94920-2148
500. Beverly Rockabrand, San Francisco 94108-1452
501. Beverly Webman, Santa Monica 90405-5433
502. Bianca Molgora, San Francisco 94110-6138
503. Bill Britton, Livermore 94550-3617
504. Bill Hessell, Culver City 90230-4534
505. Bill Kafkis, Maple 90210
506. bill legere, Clovis 93611-3401
507. Bill Obrien, Glendora 91741-2714
508. billie davies, Santa Clara 95051-5319
509. Billy Ragsdale, San Francisco 94110-2423
510. Birgit Hermann, San Francisco 94117-2594
511. Blaise Brockman, Arcadia 91007-6917
512. Blaize Gottman, Lake Elsinore 92530-3701
513. Blake Rothschild, Oakland 94610-1615
514. blake wu, lafayette 94549-3503
515. Blanche Korfmacher, San Francisco 94132-1661
516. Blanco Molina, Ontario 91764-2919
517. Blaze Bhence, Cypress 90630-4119
518. Bo Smitham, San Diego 92130-2180
519. Bob Denton, Costa Mesa 92626-3705
520. Bob Drury, Long Beach 90814-3014
521. Bob Kvaas, Goleta 93117-1623
522. Bob Leppo, Santa Maria 93454-2609
523. Bob Moore, Santa Clarita 91380-1974
524. Bob Plass, Los Banos 93635-6385
525. Bob Rich, Susanville 96130-4604
526. Bob Schildgen, Berkeley 94703-1630
527. Bob Stallard, Salinas 93907-1015
528. Bobbie Brown, San Diego 92114-2407
529. Bonnie Bragg Bragg, Pacific Grove 93950-3240
530. Bonnie Etz-Mott, Trinidad 95570-9784
531. Bonnie Jacobs, Los Angeles 90048-5501
532. Bonnie Karlsen, Sebastopol 95472-5937
533. Bonnie Maas, Cathedral City 92234-2301
534. Bonnie Maloney, Hawthorne 90250-8395
535. Bonnie Payne, Los Gatos 95032-6478
536. Bonnie Price, Spring Valley 91978-1963
537. Bonnie Shand, Bayside 95524-9049
538. Bonnie Stillwater, Los Angeles 90020-3003
539. Bonnie Yelverton, Fontana 92336-0856
540. Brad Boldrini, Pleasanton 94566-6384
541. Brad Knight, Sylmar 91342-6306
542. Brad Nelson, Oxnard 93035-4479
543. Brad Snyder, San Diego 92116-1017
544. Bradd Saunders, Pasadena 91107-5200
545. Bradley Colden, Whittier 90602-3112
546. Bradley Winch, Fawnskin 92333-0370
547. Braja Tarletz de Molina, Pasadena 91107
548. branden faber, Laguna Beach 92651-3660
549. Brandon Ciacchio, El Cajon 92020-1317
550. Brandon Moon, San Diego 92122-2625
551. Brandon Owens, San Francisco 94118-3418
552. Brandon Weeks, Campbell 95008-4513
553. breanna mistler, Dixon 95620-3719
554. Brenda Brazil, Cloverdale 95425-3168
555. Brenda Hager, Thousand Oaks 91360-4742
556. Brenda Honath, Citrus Heights 95610-3269
557. Brenda Koenig, Escondido 92027-1752
558. Brenda Main, Sacramento 95860-0920
559. Brenda Markham, Fresno 93730-1250
560. Brenda Osborne, San Francisco 94108-2023
561. Brenda Perez, Los Angeles 90042-3916
562. Brent Spencer, Long Beach 90808-4105
563. Brent Wu, Stockton 95203-1335
564. Bret Polish, Los Angeles 90034-5075
565. brett bell, Tujunga 91042-2456
566. Brett Holland, Los Angeles 90026-5142
567. Brett Thomsen, Redondo Beach 90278-1310
568. Brian Bui, Westminster 92683-6511
569. Brian Carnes, San Diego 92116-1615
570. Brian Carr, San Jose 95124-6033
571. Brian Cassidy, Capitola 95010-3601
572. Brian Crawford, San Anselmo 94960-1614
573. Brian Flannigan, Rancho Palos Verdes 90275
574. Brian Florian, Beverly Hills 90211-1756
575. Brian Gray, Fair Oaks 95628-3444
576. Brian Grimm, City of Industry 91715-2706

577. Brian Hicks, Oakland 94602-1303  
578. Brian Jacobson, West Hills 91307-5283  
579. Brian James, San Carlos 94070-3449  
580. Brian Kelly, San Bruno 94066-2930  
581. Brian MacKay, San Francisco 94115-2671  
582. brian olea, Woodland Hills 91367-1249  
583. Brian O'Neill, Malibu 90265-3122  
584. Brian Paulsen, Fresno 93710-6113  
585. brian schoelkopf, Seal Beach 90740-6219  
586. brian wingard, Sebastopol 95473-2658  
587. brian zeman, Rocklin 95765-4523  
588. Briana Freeman, San Jose 95124-5409  
589. Briana Kennedy, Aliso Viejo 92656-3870  
590. Briana Valdez, Los Angeles 90065-4305  
591. Brianne Sparks, Fair Oaks 95628-3703  
592. Bridget Flocco, Sonoma 95476-4001  
593. Bridgett Heinly, San Diego 92107-4210  
594. Briege Baker, Livermore 94550-4035  
595. Brigitte Greener, San Jose 95125-5905  
596. Brittany Euwema, Costa Mesa 92627-3922  
597. Bronwen Grebe, Castaic 91384-2453  
598. Brooke Battles, Oakland 94606-2373  
599. Brooke Knight, Ventura 93002-1685  
600. Brooke Prather, Santa Rosa 95404-1034  
601. Brooks Frank, San Francisco 94102-5185  
602. Bruce Benson, Newbury Park 91320-4745  
603. Bruce Bixler, Atherton 94027-6460  
604. bruce bryan, Lancaster 93536-9036  
605. Bruce Daniels, Capitola 95010-1640  
606. Bruce Doucette, Fallbrook 92028-2101  
607. Bruce England, Mountain View 94043-5255  
608. Bruce Finocchio, Castro Valley 94546-7221  
609. Bruce Hector MD, Santa Clarita 91387-5009  
610. Bruce Kintz, Idyllwild 92549-0223  
611. Bruce Marlow, Nevada City 95959-8939  
612. Bruce McKinley, Mount Shasta 96067-1298  
613. Bruce Pollock, North Hollywood 91601-4343  
614. Bruce Raymond, Oceanside 92054-2409  
615. Bruce Stubbs, Carlsbad 92010-2185  
616. Bruce Veldhuizen, Oakland 94619  
617. Bruce Wallace, Vista 92084-4207  
618. Bruce White, Scotts Valley 95067-6616  
619. Bryan Ruff, Paradise 95969-2664  
620. Bryant Wong, Mission Viejo 92692-2860  
621. Bryna Fuchslocher, Thousand Oaks 91360-4846  
622. Bryna Herbold, Claremont 91711-2741  
623. Bryna Schreier, Burbank 91504-1203  
624. Budd Seeley, Alameda 94501-1433  
625. Burt Greenspan, Novato 94947-5201  
626. C Kerns, Santa Ana 92706-3724  
627. C Burdette, Los Angeles 90066-5720  
628. C D, Berkeley 94703-1019  
629. c Foglietta, Arroyo Grande 93420-5205  
630. C G, San Diego 92122-2520  
631. C James, Clovis 93613-0032  
632. C L Lindsley, vacaville 95687  
633. C Leerer, Berkeley 94702-2027  
634. C McGee, Los Angeles 90048-1402  
635. C McRae, Fairfax 94930-1315  
636. C Zuber, Tujunga 91043-0672  
637. Caia Cupito, Redding 96003-8277  
638. CALVIN JUNG, Burbank 91505-3450  
639. Camile Getter, Sacramento 95819-3139  
640. Camilla Comanich, Berkeley 94707-1926  
641. Camille Avellano, La Crescenta 91214-2213  
642. Camille Gilbert, Santa Barbara 93101-4045  
643. Camille Spar, Woodside 94062-3641  
644. Candace Rocha, Los Angeles 90031-1048  
645. Candace Slivinski, Hawthorne 90250-6530  
646. Candice Silverstein, North Hollywood 91606  
647. Candy Haggblom, Encinitas 92024-1146  
648. Cara Barnhill, Coarsegold 93614-9109  
649. cara lynn pugh, Ventura 93003-6266  
650. Cara O'Neill, Calistoga 94515 9634  
651. Caralee Cowen, Walnut Creek 94595-2559  
652. Caren Normandin, Rohnert Park 94928-2837  
653. Carina Cutler, Kings Beach 96143-0488  
654. Carissa Wise, Simi Valley 93065-3315  
655. Carl Babcock, Campbell 95008-1831  
656. Carl Blank, Twin Peaks 92391-1330  
657. Carl Luhning, Vista 92081-8829  
658. Carl Mueller, San Pedro 90731-3010  
659. Carl Muller, Huntington Beach 92649-2114  
660. Carl Parmley, Joshua Tree 92252-3375  
661. Carl Sorem, Livermore 94550-4079  
662. Carl Wishner, Chicago Park 95712-0665  
663. Carla Dimondstein, Fort Bragg 95437-8214  
664. Carla Fowler, Richmond 94804-7486  
665. Carla Quinones, Santa Rosa 95404  
666. Carla Ritter, Mckinleyville 95519-8120  
667. Carla Silva, Redondo Beach 90277-2241  
668. Carlanne Snyder, Castro Valley 94546-3441  
669. Carlos Arnold, Santa Maria 93455-2329  
670. Carlos Delatorre, Rch Cucamonga 91737-4371  
671. Carlos Nunez, Reseda 91335-6421  
672. Carly Molstad, Los Angeles 90042-3745  
673. Carmel Dagan, Los Angeles 90048-4817  
674. Carmen Battung, Simi Valley 93065-0617  
675. Carmen Carrasco, Studio City 91604-1137  
676. Carmen Dello Buono, San Jose 95123-2424  
677. Carmen Fried, Pasadena 91106-1044  
678. Carmen Gagne, Watsonville 95076-2700  
679. Carmen Meneses, Concord 94521-4010  
680. Carmine Chavez, Canyon Country 91351-3021  
681. Carol and Antonio Rocha, Martinez 94553-5417  
682. Carol Anna Lind, San Francisco 94117-4460  
683. Carol Baier, San Diego 92103-4603  
684. Carol Barner, Menlo Park 94025-1916  
685. Carol Becker, Sherman Oaks 91423-4017  
686. Carol Bettencourt, San Francisco 94109-3960

687. Carol Blaney, Redlands 92373-0521
688. Carol Cotter, Granada Hills 91344-1219
689. Carol Culp, Felton 95018-9103
690. carol dicks, Redwood Valley 95470-9764
691. Carol Downey, Carmichael 95608-4304
692. Carol Easton, Aptos 95003-9762
693. Carol Fusco, Berkeley 94708-2058
694. Carol Gordon, Los Angeles 90027-1118
695. Carol Gurunathan, Mountain View 94040-3746
696. Carol H, San Rafael 94903-1209
697. Carol Hawley, San Diego 92116-3120
698. Carol Holland, Costa Mesa 92627-5430
699. carol houck, Ojai 93023-1620
700. Carol Kummer, Oakland 94610-2432
701. Carol Lake, Solvang 93463-2138
702. Carol Lesh, Berkeley 94702-1304
703. Carol Mock, Fremont 94536-1601
704. Carol Patton, Danville 94506-1146
705. Carol Rasmussen, Walnut Creek 94595-1249
706. Carol Ray, Fontana 92335-3659
707. Carol Rigrod, Encino 91316-2702
708. carol rivers, Los Altos 94022-1025
709. Carol Sangster, Ojai 93024-0149
710. Carol Schaffer, San Pablo 94806-1648
711. Carol Stotts, Santa Barbara 93109-1831
712. Carol Taggart, Menlo Park 94025-5560
713. Carol Taylor, Ojai 93023-3055
714. Carol Treacy, Petaluma 94952-2634
715. carol uschyk, Calistoga 94515-1122
716. Carol Watts, Placentia 92870-6026
717. carol whitnah, inverness 94956
718. Carol Wiley, Victorville 92394-1383
719. Carol Wolfe, Santa Rosa 95405-7037
720. Carole Ann Cole, Santa Barbara 93103-2135
721. Carole Cannon, Rocklin 95677-4213
722. Carole Hisasue, Los Osos 93402
723. Carole Lebental, Rancho Palos Verdes 90275
724. Carole Reiner, Fullerton 92835-2034
725. Carolee Tamori, Oroville 95966-9244
726. Caroline Bergdolt, San Francisco 94129-1256
727. Caroline Beverstock, Atherton 94027-6460
728. Caroline Elman, Northridge 91343-4525
729. Caroline Warren, Chico 95973-0751
730. Carolyn Adamick, Valencia 91355-4443
731. Carolyn Anderson, Sutter Creek 95685-1447
732. Carolyn Boor, Rancho Cucamonga 91730-6893
733. carolyn flook, Santa Monica 90405-1625
734. Carolyn Galluzzo, Oxnard 93036-5392
735. Carolyn Hinds, Fair Oaks 95628-3234
736. Carolyn Howerton, Valley Springs 95252-9394
737. Carolyn Johnson, Glendale 91206-1112
738. Carolyn Keck, San Jose 95112-3442
739. Carolyn Mone, Woodside 94062-4806
740. Carolyn Pettis, Canyon Country 91387-3138
741. Carolyn Rhazi, Mission Viejo 92691-5213
742. Carolyn Sabin, Chico 95926-3445
743. Carolyn Shafer, Port Hueneme 93041-1924
744. Carolyn Shepard, Belmont 94002-2816
745. Carrie Anderson, Oakland 94602-2710
746. Carrie Kappel, Santa Barbara 93108-2617
747. Carrie Kost, Oakland 94611-4707
748. Carrie Lindh, Richmond 94805-1610
749. Carroll Nast, Colfax 95713-9234
750. Cary Frazee, Eureka 95503-9592
751. caryl carr, Palo Alto 94301-2628
752. Caryn Graves, Berkeley 94702-1329
753. Caryn Nordskog, Orangevale 95662-3306
754. Caryn Turrieta, Sunnyvale 94086-7401
755. Casee Maxfield, Los Angeles 90028-8647
756. Casey Martinez, San Francisco 94122-1417
757. Cassandra Voss, Porter Ranch 91326-1027
758. Cassidy Ballentine, Thousand Oaks 91358-0164
759. Cassie Kifer, San Jose 95112-1702
760. Catharine Page-Lekas, Ferndale 95536
761. Cathe Dietrich, Albany 94706-2336
762. Catherine Allen, Shingletown 96088-9528
763. Catherine Bastug Vincenti, Santa Barbara 93101
764. Catherine Beauchamp, Pasadena 91103-2052
765. catherine eaton, Pacific Palisades 90272-1901
766. Catherine FitzGerald, Santa Barbara 93103-1945
767. Catherine Gardiner, Van Nuys 91406
768. Catherine Halley, Oak View 93022-0192
769. Catherine Hunter, La Crescenta 91214-1534
770. Catherine Macan, Eureka 95501-2564
771. catherine pesce, Morgan Hill 95037-3020
772. Catherine Quinlog, Westminster 92683-1940
773. Catherine Riley, Chico 95928-5860
774. Catherine Scott, Hidden Valley Lake 95467-8717
775. Cathleen Branich, Sacramento 95820-5032
776. Cathleen Caffrey, Santa Rosa 95409-2732
777. Cathy Carr, Sonoma 95476-4224
778. Cathy Collings, Nevada City 95959-1921
779. Cathy Cretser, Vacaville 95688-9639
780. Cathy Crum, Agoura Hills 91301-3508
781. Cathy Goodrich, Verdugo City 91046-1002
782. Cathy Grovenburg, San Jose 95124-1512
783. Cathy Heinrich, Merced 95348-2201
784. Cathy Holden, Sacramento 95864-2907
785. cathy juhlin, Paso Robles 93446-2954
786. Cathy L Hodge, Carmichael 95608-4045
787. Cathy Mullins, Laguna Beach 92651-1106
788. Cathy O'Connor, Napa 94558-2262
789. Cathy Rubin, San Jose 95112-2158
790. Cathy Stansell, Frazier Park 93225-0802
791. Cay Fisher, Big Sur 93920-0612
792. Cayley Stoker, Malibu 90265-4774
793. CC Hollis-Franklyn, Belvedere Tiburon 94920
794. Cecelia Wright, Coronado 92118-2971
795. cecile moochnek, Berkeley 94709-1927
796. Celeste Bianco, Sacramento 95817-3643

797. cesar caso, San Jose 95116-2548  
798. Cesar Romero, San Jose 95123-3328  
799. Ceyla Ludwig, South San Francisco 94080-4744  
800. Chad Johnson, Long Beach 90806-5601  
801. Chanda Unmack, Santa Clara 95050-6171  
802. Chandra Tobey, Vista 92084-2830  
803. Chanelle Black, Huntington Beach 92648-4725  
804. Chanelle Black, Huntington Beach 92648-5947  
805. Charesa Harper, Glen Ellen 95442-9743  
806. Charleen Kubota, Oakland 94611-1221  
807. Charlene Arbogast, Mendocino 95460-9727  
808. Charlene Santiago, San Jose 95131-3608  
809. Charles B, Tarzana 91356-1971  
810. Charles Calhoun, San Francisco 94115-3310  
811. Charles Fishburn, Porterville 93258-0449  
812. Charles Fry, Sunnyvale 94085-3459  
813. Charles Hammerstad, San Jose 95120-3334  
814. Charles Hawk, Fairfield 94534-3322  
815. Charles Heinrichs, Oakland 94619-1733  
816. Charles Inman, Redwood City 94062-2863  
817. Charles Jones, Santa Rosa 95409-3207  
818. Charles Moran, Novato 94947-4331  
819. Charles Richard Jr, Antioch 94509-4847  
820. Charles Richmond, Westminster 92683-8609  
821. Charles Sharpe, Bayside 95524-9301  
822. Charles Siegel, Berkeley 94704-1210  
823. Charles Smith, San Jose 95136-2033  
824. Charles Tetoni, Santa Barbara 93103-2214  
825. Charles Turner, Chatsworth 91311-3608  
826. Charles Wilmoth, San Francisco 94124-1017  
827. Charley Cross, Sacramento 95831-2929  
828. Charlie BERGSTEDT, San Francisco 94133-1966  
829. Charlie Willis, Inglewood 90301-9136  
830. Charline Ratcliff, Walnut Creek 94596-4609  
831. Charlotte Dickson, San Jose 95135-1336  
832. Charlotte Gray, Hemet 92544-5236  
833. Charlotte Liniger, Martinez 94553-5853  
834. Charlotte Sonoda, Berkeley 94709-2022  
835. Chase Chakeris, San Francisco 94132-3293  
836. Chayanne Medina, Santa Ana 92701-6021  
837. Chee Goh, Mission Viejo 92694-0738  
838. Chellsa Avelin, San Anselmo 94960-1251  
839. Chelsea Swick, Bayside 95524-9066  
840. Cher Clarke, London 90210  
841. Cheri Leslie, Venice 90291-3846  
842. Cheri Messerli, Los Angeles 90039-3004  
843. Cheri Michalak, Escondido 92026-3915  
844. Cherie Connick, Crescent City 95531-9677  
845. Cherilyn Smith, Los Angeles 90046-4164  
846. Cherry Robinson, San Diego 92109-1407  
847. Cheryl Albert, Freedom 95019-2708  
848. Cheryl Berry, Irvine 92604-3058  
849. CHERYL CALLERI, Santa Cruz 95062-4336  
850. Cheryl Charles, Hemet 92545-9584  
851. Cheryl Del Vecchio, Loomis 95650-8797  
852. Cheryl Divine, Columbia 95310-1229  
853. Cheryl Fieber, Laguna Niguel 92677-7057  
854. cheryl flango, San Francisco 94124-2335  
855. Cheryl Gourgouris, Santa Monica 90402-1145  
856. Cheryl Heinecke, San Clemente 92673-2755  
857. Cheryl Holder, Culver City 90230-6167  
858. Cheryl Keith, Rancho Cordova 95670-3852  
859. Cheryl Kozanitas, San Mateo 94403-1240  
860. Cheryl LaBrecque, San Francisco 94114  
861. Cheryl Torralba, Chatsworth 91311-4503  
862. Cheryl Young, Corona 92880-3052  
863. Cheryll Desberg, Los Angeles 90068-1935  
864. Che-Yuan Chang, Walnut Creek 94598-1311  
865. chloe ross, West Hollywood 90046-5523  
866. Chris Aycock, San Francisco 94116-3039  
867. Chris Ayers, Los Angeles 90034-5438  
868. Chris Bachman, South Pasadena 91030-4355  
869. Chris Brentlinger, Santa Cruz 95062-3226  
870. chris cairns, Lakeport 95453-3623  
871. Chris Choy, San Francisco 94112-2949  
872. Chris DeGoeas, Cerritos 90703-2306  
873. Chris Eaton, Tujunga 91042-1836  
874. chris eisel, Torrance 90504-4521  
875. Chris Jones, Venice 90291-4791  
876. Chris Leverich, Playa Del Rey 90293-8919  
877. Chris Loo, Morgan Hill 95037-3864  
878. Chris MacKrell, Long Beach 90813-4717  
879. Chris Malo, Larkspur 94939-1420  
880. Chris Rose, Sonoma 95476-3229  
881. Chris Rutledge, Hemet 92544-9524  
882. Chris Seaton, Santa Barbara 93101-4651  
883. Chris Shulda, Lake Forest 92630-6127  
884. Chrissy Sepulveda, Anaheim 92802-4778  
885. Christel Capps, San Jose 95123-1302  
886. Christel Cranston, Anderson 96007-1108  
887. Christian Elliott, Santa Clara 95050-4409  
888. Christin Miller, Los Angeles 90049-1230  
889. Christina Anderson, Laguna Niguel 92677-4259  
890. christina baird, Vacaville 95687-7379  
891. Christina Beecher, Santa Ana 92705  
892. Christina George, Anderson 96007-8258  
893. Christina Irving, SONORA 95370  
894. Christina Leard, Richmond 94804-5118  
895. Christina Locke, Simi Valley 93063-3510  
896. Christina Merlo, Oakland 94611-4404  
897. Christina Mills, Browns Valley 95918-9666  
898. Christina Mills, Woodland 95695-6008  
899. Christina Nagao, Woodland Hills 91364-3021  
900. Christina Nillo, W Hollywood 90069-5525  
901. Christina Rios, Carmichael 95608-2377  
902. Christina Skillin, Calabasas 91302-1839  
903. Christine Anderson, Lafayette 94549-2221  
904. Christine Borje, Los Angeles 90039-1926  
905. Christine Bourg, Pleasanton 94566-7338  
906. Christine C Jones, Alameda 94502-6901

907. Christine Cadd, Davis 95616-5637
908. Christine Elgin, San Carlos 94070-1638
909. christine fiorentino, Samoa 95564-0044
910. Christine Gary, Sacramento 95831-3787
911. Christine Hayes, Upland 91786-2161
912. Christine Hoefflich, Scotts Valley 95066-3027
913. Christine McAfee-Ward, San Jose 95123-2549
914. Christine Nathanson, Napa 94558-2455
915. Christine Perkins, Sacramento 95819-4043
916. christine raffetto, Healdsburg 95448-0925
917. Christine Rideout, Escondido 92027-6739
918. Christine Salido, San Mateo 94403-4219
919. Christine Sloss, Oakley 94561-3523
920. Christine Stewart, Escondido 92026-1461
921. Christine Taira-Lin, Irvine 92614-7097
922. Christine Weinstein, San Diego 92111
923. Christine Zembal, Culver City 90232-3236
924. Christophe Jonatowski, Sun Valley 91352-1127
925. Christopher Carson, Burbank 91505-2831
926. Christopher Chatard, San Diego 92116-1739
927. Christopher D Stanton, Portola 96122-1595
928. Christopher Dunnbier, Healdsburg 95448-0691
929. christopher james, Nevada City 95959-2435
930. Christopher Kashap, Newbury Park 91320-4950
931. CHRISTOPHER NIAL, Camarillo 93012-4058
932. Christopher Parsons, Los Angeles 90027-1113
933. Christopher Rand, Richmond 94801-3979
934. Christopher Stahl, Sunnyvale 94086-6618
935. Christopher Valadez, Sylmar 91342-5161
936. Christopher Yocum, Yucca Valley 92284-6016
937. Chuck Karp, Palm Desert 92261-4423
938. Chuck Riess, Santa Clara 95051-6501
939. chuck rocco, Simi Valley 93065-2647
940. Chung-Wei Chan, San Jose 95129-3800
941. Ciji Ware, Sausalito 94965-2104
942. Cinda Johansen, Folsom 95630-7928
943. Cinda Spinks, Los Angeles 90042-1361
944. Cindy Beckley, Oakland 94619-3310
945. Cindy Brillhart True, Sonoma 95476-6454
946. Cindy Meyers, Capitola 95010-0423
947. Cindy Stein, Thousand Oaks 91360-1522
948. Cindy Taylor, Daly City 94015-3539
949. Claire Perricelli, Eureka 95501-1312
950. Claire Simonich, Half Moon Bay 94019-5107
951. Claire Watson, Pleasant Hill 94523-5157
952. Clara Carpenter, Alameda 94501-3334
953. Clare Hooson, Belmont 94002-3511
954. Clarence Butler, Redlands 92374-6312
955. Claude McDonald, San Jose 95120-1930
956. claudia Alongi, Cathedral City 92234-3918
957. Claudia Hasenhuttl, Glendale 91206-4621
958. Claudia Mansfield, Weed 96094-9046
959. Claudia Misner, Fairfax 94930-2017
960. Clemens Goewert, Clovis 93619-3909
961. Clifford Gamble, Los Angeles 90043-2040
962. clinton northcutt, Needles 92363-3434
963. Clover Catskill, Pinole 94564-2102
964. Clover Seely, Grass Valley 95945-6719
965. Coach Ron, Los Angeles 90014-2013
966. Coleen Scholfield, Redding 96049-4841
967. COLETTE PIACENTINI, Santa Barbara 93105
968. Colette Stroud, West Hollywood 90046-5527
969. Colin Boyd, Novato 94945-1231
970. Colin McHugh, Los Angeles 90019-2554
971. Colleen Bednarz, Santa Cruz 95062-2628
972. Colleen Carter, Canyon Country 91387-4990
973. Colleen Harrison, Rncho Cordova 95670-4220
974. Colleen Lobel, San Diego 92126-3121
975. Colleen Marshall, Fremont 94536-3825
976. Colleen McGuinness, Point Reyes Station 94956
977. Colleen Wieghorst, Fullerton 92835-2226
978. Collin Bowman, Tahoe Vista 96148
979. Conni Vanbilliard, Oceanside 92057-7002
980. connie batten, Santa Cruz 95062-2328
981. Connie Castro, San Diego 92126-3600
982. Connie Charles, El Cajon 92020-1119
983. Connie Cronin, Berkeley 94705-2035
984. Connie Crusha, El Cajon 92019-3579
985. Connie Hannah, Goleta 93117-6209
986. Connie Klemisch, Simi Valley 93065-3215
987. Connie Peterson, Pismo Beach 93449-2029
988. Connie Sheppard, San Diego 92122-3902
989. Constance Flannery, San Francisco 94131-2704
990. Constance Scudder, Solvang 93463-2933
991. Constance Sutton, Berkeley 94707-1913
992. Constance Youens, Murrieta 92562-3245
993. Coral Taylor, Truckee 96160-1141
994. Corey Benjamin, Los Angeles 90006-2866
995. Corey Monteith, San Francisco 94114
996. Corinn Kintz, Idyllwild 92549-0223
997. Corinne Greenberg, Berkeley 94707-1602
998. Corinne Van Houten, Sacramento 95835-1539
999. Corky Letellier, Weaverville 96093-1488
1000. Courtney C, Galt 95632
1001. cowen bailey, Northridge 91325-4242
1002. Craig Chatterton, Soquel 95073-0073
1003. craig fryer, San Jose 95118-1437
1004. Craig Golden, Lake Balboa 91406-4329
1005. Craig Olson, Santa Rosa 95404-2212
1006. craig r, encinitas 92024
1007. craig suide, San Francisco 94121-2761
1008. Craig Zuppan, Yucaipa 92399-4927
1009. Creda Markham, San Jose 95127-2624
1010. Cristian Rodriguez, Buena Park 90621-3217
1011. Cristy Bodnar, San Francisco 94118-2910
1012. Crystal Hernandez, Torrance 90501-4121
1013. Crystal Hollander, Santa Rosa 95403-3626
1014. CRYSTAL IBARRA, Riverside 92507
1015. Crystal Watson, Carmichael 95608
1016. CT Bross, Walnut Creek 94597-2423



1017. Currie Hambright, Carlsbad 92009  
 1018. Curry Sawyer, Santa Barbara 93103-2067  
 1019. Curtis Swan, Long Beach 90802-1164  
 1020. Cyndi Houck, Santa Rosa 95405-4747  
 1021. Cyndi Otero, Orangevale 95662-3033  
 1022. Cynthia Belliveau, Ojai 93023-2883  
 1023. Cynthia Byrd, San Francisco 94133-2648  
 1024. Cynthia Coley, Lake Forest 92630-2607  
 1025. Cynthia Coty, Alhambra 91801-2804  
 1026. Cynthia Falsken, Norco 92860-2711  
 1027. Cynthia Luas, Hesperia 92345-3429  
 1028. Cynthia Mahoney, Danville 94526-3670  
 1029. Cynthia McMath, Boonville 95415-9101  
 1030. Cynthia Meyer, Santa Rosa 95405-8326  
 1031. Cynthia Patrick, Ventura 93004-2370  
 1032. Cynthia Rickley, Whittier 90601-3718  
 1033. Cynthia Sills, Rancho Cordova 95670-6992  
 1034. Cynthia Travis, San Francisco 94117-3815  
 1035. CYNTHIA TROTTA, West Covina 91791-4123  
 1036. Cynthia Vincent, Torrance 90505-6921  
 1037. Cynthia Wilder, Rancho Palos Verdes 90275  
 1038. D Ashurst, Corning 96021-2331  
 1039. D Aspen, Santa Barbara 93120-2247  
 1040. D B, Berkeley 94703  
 1041. D B, Carlsbad 92009  
 1042. D Metrov, Goleta 93117-1961  
 1043. Dale Drouin, Walnut Creek 94596-3326  
 1044. Dale Haas, San Diego 92115-2202  
 1045. Dale Keeler, Pomona 91768-1190  
 1046. Dale McCart, Irvine 92620-3360  
 1047. Dale Peterson, Berkeley 94710-2520  
 1048. Dale Riehart, San Francisco 94107-1807  
 1049. Dalia Salgado, LOS ANGELES 90071  
 1050. Damian James, Oakland 94609-2739  
 1051. Damien Hodge, Fontana 92336-4251  
 1052. Damon Brown, Los Angeles 90016-5229  
 1053. Dan Anderson, Roseville 95747-5045  
 1054. Dan Cantor, Los Angeles 91206  
 1055. Dan Clark, Big Sur 93920-9538  
 1056. Dan Eloff, Sunnyvale 94089-5001  
 1057. Dan Esposito, Manhattan Beach 90266-4082  
 1058. Dan Greaney, Redding 96003-7038  
 1059. Dan Henneberger, Los Angeles 90066-6696  
 1060. Dan Matthews, Valley Center 92082  
 1061. Dan McCrory, Northridge 91324-4533  
 1062. Dan Rauschenberg, Desert Hot Springs 92240  
 1063. Dan Reitz, Corona Del Mar 92625-2328  
 1064. dan walls, Stanford 94305-7553  
 1065. Dan Wilt, San Diego 92101-7586  
 1066. Dan Wilt, San Diego 92101-7598  
 1067. Dana Ahlgren, Rancho Cordova 95670-2877  
 1068. Dana Gleason, Menlo Park 94025-2548  
 1069. Dana May, Garden Grove 92840-4208  
 1070. Dana Thompson, Los Gatos 95032-7391  
 1071. Dana Weikel, Hanford 93230-7229  
 1072. Danaan DeNeve, Merced 95348-2241  
 1073. Dani Bowman, La Canada Flintridge 91011  
 1074. Dania Moss, Soquel 95073-9537  
 1075. Daniel Aleman, San Bernardino 92410-2726  
 1076. Daniel Aron, San Francisco 94107  
 1077. Daniel Cantor, Withheld 91206  
 1078. daniel carroll, Palm Springs 92262-4005  
 1079. Daniel Choi, San Francisco 94114-1600  
 1080. DANIEL DENIS, Santee 92071-1448  
 1081. Daniel Dowdle, San Diego 92103-4202  
 1082. Daniel Fidelman, Palm Desert 92260-5328  
 1083. Daniel Goldberg, Santa Cruz 95060-2738  
 1084. Daniel Gonzales, Lancaster 93536-8321  
 1085. Daniel Gonzalez, San Diego 92129-3819  
 1086. Daniel Hickey, Cypress 90630-4000  
 1087. Daniel Lang, San Francisco 94102-5058  
 1088. Daniel Moyer, Redwood City 94061-2142  
 1089. Daniel Podell, Santa Rosa 95404-2225  
 1090. Daniel Shalit, Wrightwood 92397  
 1091. Daniel Slosberg, Corona 92881-6400  
 1092. Daniel Stevens, Healdsburg 95448-9601  
 1093. Daniel Tiarks, Los Angeles 90046-7127  
 1094. Daniel Weil, Sebastopol 95472-4211  
 1095. Daniel Williams, Victorville 92392-9478  
 1096. Daniela Enriquez, San Bernardino 92407-6915  
 1097. Daniele O'Loughlin, Van Nuys 91405-3007  
 1098. Daniell Hepting, San Diego 92116-4539  
 1099. danielle thomas, Santa Monica 90405-4836  
 1100. Danika Kohler, Valley Village 91607-2760  
 1101. Dannah Murphy, Capo Beach 92624-1337  
 1102. Danny Greene, Escondido 92025-6012  
 1103. Dara Alexander, Bolinas 94915  
 1104. DARALYNN NAPOLEON, Stockton 95209-  
 1105. Daria Kent, Nevada City 95959-0765  
 1106. Dariel Miller, Calabasas 91302-2225  
 1107. Darienne Hetherman, Altadena 91001-4726  
 1108. Darin Sullivan, Santa Barbara 93105-4092  
 1109. Darla Decker, Grass Valley 95949-7173  
 1110. DARLENE BRINLEY, Santa Monica 90402-  
 1111. Darlene Vales, San Jose 95135-2217  
 1112. Darrell Clarke, Pasadena 91101-2568  
 1113. Darrell Gilbert, Cerritos 90703-6146  
 1114. Darrell Neft, Costa Mesa 92626-2324  
 1115. Darren Frale, Los Angeles 90065-3214  
 1116. Dashiell Dunkell, Santa Cruz 95060-5909  
 1117. Dave Chelsea-Seifert, Foster City 94404-1851  
 1118. Dave Ferguson, Sunland 91040-1849  
 1119. Dave Hullfish Bailey, Van Nuys 91401-3036  
 1120. Dave Martin, Boonville 95415-1059  
 1121. David & Pat Dowdey, Thousand Oaks 91360-  
 1122. David Adams, Penn Valley 95946-9503  
 1123. David Aloisi, Hermosa Beach 90254-4831  
 1124. David and Lisa Krausz, Tiburon 94920-1344  
 1125. David Arnold, Redding 96003-9319  
 1126. David Attarzadeh, Fremont 94538-3069

1127. David Attarzadeh, Sunnyvale 94086-7640  
1128. David Aylward, Redwood City 94061-2773  
1129. David Bauer, Santa Rosa 95403-3138  
1130. David Beauvais, San Francisco 94122-1547  
1131. David Berry, Los Angeles 90024-5756  
1132. David caliendo, NEWPORTBEACH 92662  
1133. David Carter, Redlands 92373-4827  
1134. David Coleman, Cobb 95426  
1135. David Cronin, Orinda 94563-1839  
1136. David Crosby, Auburn 95603-9547  
1137. David Cull, Los Angeles 90026-6331  
1138. David Czamanske, Alhambra 91801-1771  
1139. David Delagarza, Los Angeles 90038-1648  
1140. David Diep, San Jose 95136-2118  
1141. David Doering, San Francisco 94109-3607  
1142. David Dunnigan, Pacific Grove 93950-2223  
1143. david EDF gurley, Santa Rosa 95404  
1144. David Ellis, Santa Rosa 95407-9107  
1145. David Foulger, Apple Valley 92307-3200  
1146. David Fried, Santa Monica 90401-2347  
1147. David Goll, San Jose 95123-2004  
1148. David Griffith, Rancho Cucamonga 91737-3017  
1149. David Hagberg, Lakeport 95453-8729  
1150. David Halsing, San Leandro 94577-3828  
1151. David Hammond, Willits 95490-8764  
1152. David Harralson, Studio City 91604  
1153. David Harris, Ventura 93003-1906  
1154. David Harrison, Gardena 90247-4026  
1155. David Haskins, San Diego 92105-1264  
1156. David Heinrichsen, San Jose 95136-2951  
1157. David Hermeyer, San Francisco 94117-2240  
1158. David Hirsch, Campbell 95008-4353  
1159. David Hunt, Fallbrook 92028-9149  
1160. David Illig, Fair Oaks 95628-7521  
1161. David Johnson, Ventura 93003-4736  
1162. David Jones, San Francisco 94114-3637  
1163. David Kent, Windsor 95492-9401  
1164. David Kranzler, San Mateo 94402-3225  
1165. David Lau, Mission Viejo 92692-5190  
1166. David Leavengood, Burbank 91505-5402  
1167. David Mabe, Thousand Oaks 91320-7056  
1168. David McCord, Oakland 94602-3029  
1169. David McLaughlin, Burbank 91505-2330  
1170. David Miller, Redondo Beach 90277-2133  
1171. David Misch, Santa Monica 90403-4701  
1172. David Osterhoudt, Rancho Santa Margarita 92688  
1173. David P Peterson, San Diego 92116-4841  
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1175. David Passmore, Cazadero 95421-9500  
1176. David Peha, Torrance 90503-1205  
1177. David Perry, Palo Alto 94306-3608  
1178. DAVID RAMM, Hayward 94541-3102  
1179. David Reed, Guerneville 95446  
1180. David Rhoades, Belvedere 94920-2461  
1181. David Roche, San Francisco 94117-3104  
1182. David Samuelson, Coto DE Caza 92679-4941  
1183. David Sanders, Glendora 91740-5388  
1184. David Sherman, Santa Rosa 95405-8116  
1185. David Smith, Cathedral City 92234-1726  
1186. David Stryker, Auburn 95602-9698  
1187. DAVID TONG, Garden Grove 92840-1116  
1188. David Tramutolo, Bishop 93514-2973  
1189. David Varnum, San Francisco 94117-1006  
1190. David Wappler, Ojai 93024-1297  
1191. David Watson, Guerneville 95446  
1192. David Weber, Aliso Viejo 92656-2819  
1193. David West, San Jose 95126-3118  
1194. David Williams, Oakland 94602-1046  
1195. David Yamaguchi, Fresno 93704-1850  
1196. David Zebker, San Francisco 94102-1685  
1197. Dawn Ayers, Rancho Palos Verdes 90275-2255  
1198. Dawn Dowdy, Visalia 93277-7075  
1199. Dawn Lay, San Clemente 92672-6426  
1200. Dawn Perez, Santa Rosa 95401-5850  
1201. dawn tesluk, Oceanside 92054-5727  
1202. Dawn Welden, San Mateo 94404-2016  
1203. Dawn Ziegler, Fontana 92335-5571  
1204. Dawne Adam, Walnut Creek 94597-7528  
1205. Dawnell Blaylock, Auburn 95602-8875  
1206. Dayna Woerner, Novato 94949-6282  
1207. Dean McCleskey, Santa Ana 92706-1937  
1208. Dean Peppard, Downey 90240-2622  
1209. dean weiss, Encino 91436-1411  
1210. Deann Wright, San Francisco 94121-1016  
1211. Deanna Rhoades, La Mesa 91942-5069  
1212. Deb St Onge, Poway 92064-3945  
1213. Debbie Atlas, Newbury Park 91320-5913  
1214. Debbie Bolsky, Santa Monica 90403-1162  
1215. Debbie Chaddock, San Diego 92116-3954  
1216. debbie galletly, Pasadena 91105-1705  
1217. Debbie Gerberich, Apple Valley 92307-5633  
1218. Debbie Kalama Perkins, Albany 94706-1502  
1219. Debbie Kasch, Red Bluff 96080-3505  
1220. Debbie Lloyd, Montara 94037  
1221. Debbie Notkin, Oakland 94609-1004  
1222. Debbie Rudell, Camarillo 93010-2102  
1223. Debbie Sayre, Fremont 94536-5277  
1224. Debbie Stamp, Redwood Valley 95470-6149  
1225. Debbie Wagstaff, Barstow 92312-2065  
1226. Debbie Wescott, Vista 92085-0691  
1227. Debby Berg, Los Angeles 90049-2226  
1228. Deborah Alcaraz, Madera 93636-7603  
1229. Deborah Alexzander, Castro Valley 94546-2271  
1230. Deborah Bacon Dilts, Santa Cruz 95060-1027  
1231. Deborah Baldwin, Oakland 94618-2121  
1232. Deborah Biron, Hayward 94544-6815  
1233. Deborah Chesher, Irvine 92620-3375  
1234. Deborah Childers, Turlock 95382-3200  
1235. Deborah Coates, Los Angeles 90065-2541  
1236. Deborah Colotti, Santa Rosa 95404-2241

1237. Deborah Colotti, Sebastopol 95472-4839
1238. Deborah Cosetto, Manteca 95336-5177
1239. Deborah Cowder, Oakland 94606-1120
1240. Deborah Evans, Mission Viejo 92691-3636
1241. Deborah Fallender, Santa Monica 90405-2828
1242. Deborah Fischer, Fair Oaks 95628-6921
1243. Deborah Ford, Woodland 95776-0056
1244. Deborah Gostin, San Diego 92103-4866
1245. Deborah Gray, Truckee 96161-7036
1246. Deborah Gunther, Santa Barbara 93105-2129
1247. Deborah Hall, San Francisco 94117-4020
1248. Deborah Holcomb, Los Angeles 90025-6314
1249. Deborah Holland, Temecula 92592-7701
1250. Deborah Jenkins, Hacienda Heights 91745-5602
1251. Deborah Konar, Oakland 94618-1053
1252. Deborah Lakeman, Studio City 91604-2125
1253. Deborah Lee Chill, Yucaipa 92399-5374
1254. Deborah McCarthy, San Clemente 92672-9494
1255. Deborah McCarthy, San Clemente 92673-6917
1256. Deborah Miller, Del Rey Oaks 93940-5624
1257. Deborah Parker, Oakland 94611-1309
1258. Deborah Pendrey, Oak View 93022-9312
1259. Deborah Sargent, Poway 92064-6510
1260. Deborah Sjin, Long Beach 90814-2710
1261. Deborah Werter, Lodi 95242-3925
1262. Deborah Williams, Gardena 90249-1520
1263. Deborah Wood, Fairfield 94533-5241
1264. Debra Banes, Sacramento 95834-9641
1265. Debra Day, Livermore 94550-4342
1266. Debra Dizin, Oakland 94619-1222
1267. Debra Jurey, Templeton 93465-9308
1268. Debra Polansky, Auburn 95603-9456
1269. Debra Rasmussen, Oroville 95966-8030
1270. Debra Roberts, El Dorado Hills 95762-5520
1271. Debra Sakarias, Alpine 91901-3918
1272. Debra Shwiff, Laguna Beach 92651-2537
1273. Debra Stretch, Sebastopol 95473-0218
1274. Debra Taube, San Francisco 94123-4227
1275. Debra Wanamaker, San Jose 95126-3116
1276. Dedra Hauser, Palo Alto 94306-1148
1277. Dee Warenycia, Roseville 95661-7303
1278. Deimile Mockus, Los Angeles 90004-3837
1279. Deirdre Boland, Los Angeles 90027-5550
1280. Delaire Fattah, Los Angeles 90024-8301
1281. Dena Elfert, Berkeley 94702-1753
1282. Dena Schwimmer, Los Angeles 90019-2407
1283. Denali McCullough, San Jose 95123-2048
1284. Denese Burrell, Vacaville 95687-3412
1285. Denese Stokes, Big Bear City 92314-0272
1286. Deni Marshall, Elk Grove 95758-4137
1287. Denice Eldridge, Vacaville 95687-5112
1288. Denise Baker, La Crescenta 91214-3821
1289. Denise Barger, Bishop 93514-9506
1290. Denise Belsey, Oceanside 92057-4205
1291. Denise Berezonsky, Oakland 94608-2744
1292. Denise Bunger, San Jose 95132-1615
1293. Denise Couey, Riverside 92506-5356
1294. Denise Crum, Oceanside 92057-4205
1295. Denise Edwards, Redding 96002-3335
1296. Denise Fachko, Buena Park 90621-3324
1297. Denise George, San Francisco 94117-2248
1298. Denise Lenardson, Sunland 91040-1916
1299. Denise Lenker, San Clemente 92672-5191
1300. Denise Leyda, Campbell 95008-0683
1301. Denise Lindsly, Walnut Creek 94597-3208
1302. Denise Redden, Auburn 95603-4125
1303. Denise Smith, Scotts Valley 95066-3005
1304. Denise Vandermeer, Woodland Hills 91367-5312
1305. Denise Williams, Santa Barbara 93101-3107
1306. Denise Yamamoto, Torrance 90503-9340
1307. Dennis Allen, Santa Barbara 93103-3201
1308. Dennis Allen, Santa Barbara 93105-2138
1309. Dennis Brand, Santa Barbara 93109-1131
1310. Dennis Busto, San Bernardino 92405-2631
1311. Dennis Curry, Paso Robles 93446-9338
1312. Dennis Dismachek, Scotts Valley 95066-2618
1313. Dennis Hays, Vallejo 94591-7567
1314. Dennis Holz, Encinitas 92024-2226
1315. Dennis Landi, Long Beach 90813-4027
1316. Dennis Ledden, Mount Aukum 95656-0004
1317. Dennis Therry, Bayside 95524-0735
1318. Dennis Villavicencio, Three Rivers 93271-9626
1319. Derald Myers, Santa Cruz 95062-4058
1320. Derek Dewhirst, San Jose 95118-3466
1321. Derek Lockwood, Laguna Hills 92653-5439
1322. Derrell Chambers, Kensington 94708-1131
1323. Desiree Banzhaf, Santa Cruz 95060-4719
1324. Desiree Patterson, Orange 92869-1306
1325. Devin McMahon, Stanford 94305-7486
1326. Dew Drop, San Francisco 94123
1327. Dewitt Durham, San Carlos 94070-1661
1328. dg van arsdale, Burlingame 94010-4306
1329. Dh Higgins, Berkeley 94709
1330. Diana C, Hell no 95123
1331. Diana Castro, Long Beach 90814-1502
1332. Diana Cole, Oceanside 92057-1955
1333. Diana Daniels, Sacramento 95818-3600
1334. Diana Davis, San Anselmo 94960-2113
1335. Diana Good, Chico 95928-5847
1336. Diana Hoffmann, Sheep Ranch 95246-9579
1337. Diana Holmes, Petaluma 94953-0142
1338. diana kliche, Long Beach 90804-1201
1339. Diana Lubin, La Mesa 91941-7121
1340. Diana Madoshi, Rocklin 95765-5566
1341. Diana Rothman, Santa Cruz 95060-3640
1342. Diana Weinstock, Pleasanton 94566-5766
1343. Diana Wuerthner, San Francisco 94110-4905
1344. Diane Balter, San Francisco 94118-4113
1345. Diane Berliner, Los Angeles 90046-2004
1346. Diane Cantwell, Tujunga 91042-1546

1347. Diane Charles, Burbank 91506-3039
1348. Diane Clement, Los Osos 93402-2177
1349. Diane Cooper, Playa Del Rey 90293-7909
1350. Diane Cornwall, Cool 95614-2026
1351. Diane Demarco, Cambria 93428-2510
1352. Diane Gerard, Cardiff 92007-2226
1353. Diane Grobman, Santa Rosa 95409-5927
1354. Diane Johnson, Escondido 92027-1422
1355. Diane Joyce, Temecula 92592-6473
1356. Diane Knight, West Hills 91307-2516
1357. Diane Krell-Bates, San Diego 92122
1358. Diane London, Woodland Hills 91365-7071
1359. Diane Mojica, Arcadia 91006-4931
1360. Diane Neophytou, Oakland 94601-3703
1361. Diane Parks, Mission Viejo 92692-4090
1362. Diane Rossi-Pearl, South San Francisco 94080
1363. Diane Seaman, Santa Monica 90403-3259
1364. Diane Silveria, Newbury Park 91320-2127
1365. Diane Stoecken, Eureka 95501-4336
1366. Diane Wrona, Kentfield 94904-2817
1367. Dianne Brenner, El Cerrito 94530-2738
1368. Dianne Brooke, Cambria 93428-0545
1369. Dianne Bryant, Yuba City 95993-8521
1370. Dianne Burns, Carmel By The 93921-0714
1371. Dianne Sax, Venice 90291-2806
1372. Dina Street, Modesto 95355-4023
1373. Dimitri Katsaros, San Jose 95129-2021
1374. Dina Bianco, Seal Beach 90740-6158
1375. Dineo Maine, Chula Vista 91915-2322
1376. Dione King, San Francisco 94114-1811
1377. Diran Depanian, Los Angeles 90027-2478
1378. Dirk Verbeuren, Valley Village 91607-1615
1379. Dixie van der Kamp, Santa Rosa 95404-8887
1380. Dobby Morse, Oakland 94606-2562
1381. Dodie Shepard, Burbank 91505-2401
1382. Dominic De Bellis, Benicia 94510
1383. Don Bush, Los Angeles 90066-4225
1384. Don Deck, Mammoth Lakes 93546-9796
1385. Don Edwards, Sherman Oaks 91423-3217
1386. Don Johnston, Davis 95618-4418
1387. Don Madden, Grass Valley 95949-9402
1388. Don Martin, Nipomo 93444-6629
1389. Don Schwartz, Larkspur 94939-2321
1390. Don Sparks, Northridge 91325-2049
1391. Donald Betts, Oceanside 92057-8246
1392. Donald Dodge, San Francisco 94114-2325
1393. Donald Fuhrer, Montecito 93108-1415
1394. Donald Isbell, Carlsbad 92008-4241
1395. Donald M Dudan, Walnut Creek 94596-6312
1396. Donald Mackay, South Pasadena 91031-0823
1397. Donald Mosier, Del Mar 92014-2539
1398. Donald Nagle, San Mateo 94402-3605
1399. Donald O'Hare, Los Angeles 90062-2302
1400. Donald Quick, West Covina 91790-3122
1401. Donald Sauer, Pismo Beach 93449-1505
1402. Donald Taylor, Fair Oaks 95628-6411
1403. Donald Wenger, El Cajon 92021-1815
1404. Donald Wise, Villa Park 92861-2328
1405. Donna Campbell, Sonoma 95476-5425
1406. Donna Carr, MD, Encinitas 92024-2240
1407. Donna Crossman, Coronado 92118-2025
1408. Donna DeDiemar, Berkeley 94706-2506
1409. Donna Dittmore, Alturas 96101-9010
1410. Donna Fabiano, Forestville 95436-9385
1411. Donna Forst, Santa Rosa 95409-6390
1412. Donna Fountain, Downey 90242-3637
1413. Donna Giddens, Elk Grove 95758-7640
1414. Donna Jones, Penn Valley 95946-9713
1415. Donna Kincannon, Fair Oaks 95628-3730
1416. Donna Kowzan, Moorpark 93021-2844
1417. Donna Leslie-Dennis, Long Beach 90807-1225
1418. Donna Meyers, Long Beach 90814-1502
1419. Donna Olsen, Fremont 94536-7031
1420. Donna Padnos, San Jose 95124-1243
1421. Donna Pedroza, Alameda 94501-6065
1422. Donna Rogers, Irvine 92618-8073
1423. Donna Shelton, Murrieta 92562-4313
1424. Donna Simonds, Morgan Hill 95037-3926
1425. Donna Tobar, Irvine 92602-1004
1426. Donna Walker, Los Angeles 90028-7386
1427. Donna Woodhams, Rialto 92376-5024
1428. Donna-Lee Phillips, Eureka 95501-2052
1429. Donnalyne Polito, Half Moon Bay 94019
1430. Donzaleigh Abernathy, Los Angeles 90077-1724
1431. Doreen Maxwell, Ben Lomond 95005-9315
1432. Dori Peck, Los Angeles 90025-5925
1433. Doris Horvath, San Andreas 95249
1434. Doris Telles, Mountain Center 92561-0450
1435. Doris Van, Fresno 93720-2669
1436. Dorit Oren, Kensington 94708-1006
1437. Dorothy J Clazie, Petaluma 94954-8536
1438. Dorothy Jardin, Los Olivos 93441-0525
1439. Dorothy Lee, Napa 94558-4338
1440. Dorothy LiCalzi, Santa Monica 90405-4219
1441. Dorothy Mitchell, Chico 95926-1511
1442. Dorothy Nelson, Manteca 95336-4551
1443. Dorothy Thomas, San Jose 95112-1314
1444. Dorothy Wallstein, Santa Barbara 93101-3609
1445. Dorothy Wilcox, Petaluma 94952-1806
1446. Dort Rothafel, Santa Cruz 95060-5614
1447. Doug Danaher, San Jose 95124-5413
1448. Doug Edwards, Irvine 92612-4116
1449. Doug Krause, Fargo 92008
1450. Doug Kroll, Fairfax 94930-1201
1451. Doug McBride, Auburn 95602
1452. Doug Musick, Walnut Creek 94597-7570
1453. Douglas Donehoo, Los Angeles 90048-3659
1454. Douglas Dyakon, Los Angeles 90069-1313
1455. Douglas Estes, San Francisco 94118-4063
1456. Douglas Hart, Huntington Beach 92649-3692

1457. Douglas Linneman, Yucca Valley 92284-6044  
1458. Douglas McCormick, Coto DE Caza 92679-4123  
1459. Douglas Schorling, Visalia 93290-6816  
1460. Douglas Searson, Sausalito 94965-2301  
1461. Dr Betty Blue, Cypress 90630-5443  
1462. Dr Jessica Theissen, Emeryville 94608-2936  
1463. Dr Pocholo Rous, Burbank 91504-4029  
1464. Dr. Pocholo Rous, Burbank 91504-4029  
1465. Dr. Truthsayer, San Rafael 94915-1403  
1466. Drew Meseck, Laguna Beach 92651-3967  
1467. Dru Isanda, Citrus Heights 95621-1223  
1468. Duana Moser, Iajolla 92037  
1469. Duane Tucker, Palm Springs 92262-7913  
1470. Duke McPherson, Santa Barbara 93108-1027  
1471. Duncan Seffern II, San Diego 92109-1916  
1472. duncan van arsdale, Burlingame 94010-4306  
1473. Dustin Arduser, Banning 92220-2106  
1474. Dustin Haley, North Highlands 95660-4232  
1475. Dusty Smith, Santa Maria 93456-5506  
1476. Dwain Jones, Riverside 92506-2325  
1477. Dyani Bishop, Mckinleyville 95519-4230  
1478. Dylan Busby, Mammoth Lakes 93546-0736  
1479. E Antonio, Santa Monica 90404-2759  
1480. E H Estes, Mountain View 94041-1051  
1481. E Lehuanani Phillips, Santa Clarita 91321-2673  
1482. E P, Talmage 95481-0178  
1483. Eamon Briggs, Santa Cruz 95060-2906  
1484. eanthy zeltman, Apple Valley 92308-8429  
1485. Earl Balch, San Diego 92109-8249  
1486. Earl Frounfelter, Santa Maria 93454-6644  
1487. Earl Guy, Escondido 92027-4451  
1488. Earl Shimaoka, Sunnyvale 94086-4911  
1489. Earth Accounting, Sherman Oaks 91423-1163  
1490. Ed Atkins, Boulder Creek 95006-8733  
1491. Ed Giguere, Gold River 95670-7617  
1492. Ed Green, Fremont 94539-3662  
1493. ed l, Santa Monica 90404-3141  
1494. ed lin, Santa Monica 90404-3141  
1495. Ed Oberweiser, Fort Bragg 95437-8256  
1496. Edgar DeMeo, Palo Alto 94306-2313  
1497. Edh Stanley, Sacramento 95823-1457  
1498. Edie Schaffer, San Francisco 94112-2230  
1499. Edie Stafford, Pine Mountain Club 93222-6825  
1500. Edith Davidson, San Leandro 94577-6042  
1501. Edmond Green, Los Alamitos 90720-4459  
1502. Edmund Jones, Sacramento 95814-5437  
1503. Eduardo Hernandez, Menlo Park 94025-1217  
1504. Eduardo Izquierdo, Santa Cruz 95060-3538  
1505. edward abbey, Santa Monica 90401-2652  
1506. Edward Atwood, San Francisco 94103-4190  
1507. Edward Goral, Montrose 91020-2008  
1508. Edward Macan, Eureka 95501-2564  
1509. Edward Mainland, San Francisco 94105-3456  
1510. Edward Nattenberg, San Rafael 94901-1411  
1511. Edward Nattenberg, Walnut Creek 94595-2559  
1512. Edward Neely, San Francisco 94115-1724  
1513. Edward North, Palo Alto 94301  
1514. Edward Radlo, Los Altos Hills 94022-2454  
1515. Edward Redig, Paso Robles 93446-7350  
1516. Edwin Serna, Los Angeles 90011-2249  
1517. Edwina Smith, San Francisco 94114-2323  
1518. Eileen Arterburn, Escondido 92025-4313  
1519. Eileen Bill, Santa Rosa 95404-5972  
1520. Eileen Cohen, Berkeley 94702-1948  
1521. Eileen Gross, San Francisco 94117-3223  
1522. Eileen Heaser, Sacramento 95819-2717  
1523. Eileen Massey, Oakland 94608-2310  
1524. Eka Darville, Los Angeles 90066-4818  
1525. Elad Alon, El Cerrito 94530  
1526. Elaine Alfaro, Felton 95018-9637  
1527. Elaine Barrett, San Diego 92103-4474  
1528. Elaine Benjamin, Alpine 91901-2240  
1529. Elaine Berg, Simi Valley 93065-7369  
1530. Elaine Bierman, San Diego 92128-3119  
1531. elaine dove, Tustin 92780-2359  
1532. Elaine Edell, Westlake Village 91362-4742  
1533. Elaine Genasci, San Luis Obispo 93401-6710  
1534. Elaine Kluever, Huntington Beach 92646-3439  
1535. Elaine Larson, Petaluma 94954-1588  
1536. Elaine Livesey-Fassel, Los Angeles 90064-4523  
1537. Elaine Mont-Eton, San Rafael 94901-5116  
1538. Elaine Russell, Long Beach 90815-3114  
1539. Elba (Evita) McCullough-Beas, Bonita 91902  
1540. Elba McCullough, Bonita 91902-4258  
1541. Eldene Paschal, Browns Valley 95918-9645  
1542. Eleanor Anderson-Miles, Richmond 94804-4931  
1543. Eleanor Begley, Eureka 95503-7923  
1544. Eleanor Cionco, Roseville 95747-8810  
1545. Eleanor Decker, Glen Ellen 95442-1168  
1546. Eleanor Miller, Encinitas 92024-2331  
1547. Elena Hernandez, Windsor 95492-9734  
1548. Elena Myers, San Francisco 94107-3410  
1549. Elenita Duelo, Penn Valley 95946-9133  
1550. Elisa Barucchieri, San Clemente 92672-4321  
1551. Elisa Martinez, Aromas 95004-9691  
1552. Elisa Nocedal, Belmont 94002-2776  
1553. Elisabeta Revencu, San Francisco 94131-2430  
1554. Elisabeth Ann Elling, San Francisco 94114-3908  
1555. Elisabeth Belding, Oakland 94619-2029  
1556. Elisabeth Gray, Santa Barbara 93111-1691  
1557. Elisabeth Schroeder, North Hollywood 91601  
1558. Elisabeth Vitorino, Gualala 95445-8580  
1559. Elisabeth Wadleigh, Palo Alto 94303-4409  
1560. Elise Bell, Oakland 94608-4025  
1561. Elisha Morgan, San Diego 92110-1700  
1562. Elisse De Sio, San Carlos 94070-5009  
1563. Elizabeth A Flynn, Oceanside 92057-6449  
1564. Elizabeth Adan, Carmichael 95608-1858  
1565. Elizabeth Anthony, San Jacinto 92581-0695  
1566. Elizabeth Backo, Vista 92081-8337

1567. Elizabeth Bianchi, Ojai 93023-2156  
 1568. Elizabeth Burgess, Carmichael 95608-4325  
 1569. Elizabeth Caravati, San Francisco 94109-3218  
 1570. Elizabeth Chandler, Santa Cruz 95060-2301  
 1571. Elizabeth Colwell, San Diego 92106-1945  
 1572. Elizabeth Cutter, Auburn 95603-3508  
 1573. Elizabeth Daskarolis, Oakland 94619-3509  
 1574. Elizabeth Davis, Davis 95616-0146  
 1575. Elizabeth Edinger, North Hollywood 91601-3981  
 1576. Elizabeth French, Laguna Niguel 92677-5621  
 1577. Elizabeth Friis, Pleasant Hill 94523-1731  
 1578. elizabeth godwin, Santa Clarita 91351-5722  
 1579. Elizabeth Grainger, Claremont 91711-3225  
 1580. Elizabeth Guzman, Long Beach 90802  
 1581. Elizabeth Hecker, Yorba Linda 92886  
 1582. Elizabeth Jache, Lemon Grove 91945-3716  
 1583. Elizabeth Johnson, Sacramento 95831-1558  
 1584. Elizabeth Kobayashi, Penn Valley 95946-9414  
 1585. Elizabeth Levy, Richmond 94805-1136  
 1586. Elizabeth Littell, Oakland 94602-3905  
 1587. Elizabeth Livolsi, Brentwood 94513-6700  
 1588. Elizabeth Morrison, Los Angeles 90004-5914  
 1589. Elizabeth Myrin Shore, San Anselmo 94979-2748  
 1590. Elizabeth Obermeyer, San Francisco 94118-3205  
 1591. Elizabeth Powell, Pacific Grove 93950-4253  
 1592. Elizabeth Ross, San Leandro 94577-2135  
 1593. Elizabeth Rowin, Los Angeles 90027-1411  
 1594. elizabeth shaskey, Cupertino 95014-4703  
 1595. Elizabeth Shen, Mountain View 94043-2167  
 1596. Elizabeth Smith, San Francisco 94121-3614  
 1597. Elizabeth Sullivan, Penngrove 94951-0172  
 1598. elizabeth swanson, Mission Viejo 92692-2113  
 1599. Elizabeth Swarthout, Richmond 94805-2079  
 1600. Elizabeth T, San Jose 95132-2618  
 1601. Elizabeth Terry, Oakland 94609-1706  
 1602. Elizabeth Walsh, Santa Monica 90401-1613  
 1603. Elizabeth Wharton, Oakland 94619-1620  
 1604. Elizabeth Ziff, Sherman Oaks 91403-4910  
 1605. Ella Craig, Eureka 95501-3433  
 1606. Ella Craig, Eureka 95503-6371  
 1607. Ella Korsak, Diamond Bar 91765-3131  
 1608. Ellen Akre, San Rafael 94901-1407  
 1609. Ellen Blakeborough, Escondido 92026-7212  
 1610. Ellen Caprio, San Diego 92131-3724  
 1611. Ellen Cavalli, Sebastopol 95472-2144  
 1612. Ellen Koivisto, San Francisco 94122-2856  
 1613. Ellen McCann, Escondido 92027-1401  
 1614. Ellen McKnight, Glen Ellen 95442-9480  
 1615. Ellen North, Laguna Niguel 92677-1447  
 1616. Ellen Phillips, El Cajon 92019-5277  
 1617. Ellen Smith, Palo Alto 94301-3116  
 1618. Ellen Van Allen, Santa Rosa 95404-5152  
 1619. Ellen WAYKER, Los Gatos 95030-6243  
 1620. Ellen Weber, Larkspur 94939-2175  
 1621. Ellen Weld, Penn Valley 95946-9350  
 1622. Elli Kimbauer, Crescent City 95531-2152  
 1623. Ellie Thomas, Redlands 92373-6936  
 1624. Elliott Sernel, Palm Springs 92262-2911  
 1625. Elmon Kissing, Eureka 95503-9765  
 1626. Elnor Eggart, Santa Clarita 91390-5801  
 1627. Eloise Bienvenu, West Covina 91791-3846  
 1628. Elvira Arias, Harbor City 90710-4298  
 1629. Elyse Ellinger, Irvine 92620-1849  
 1630. Emi Kaneshiro, San Diego 92128-2328  
 1631. Emilie Kapon, Rancho Cucamonga 91730-3667  
 1632. Emilio Ghergo, Cambria 93428  
 1633. Emily Alma, Chico 95928-7101  
 1634. Emily Bernath, Ventura 93003-4815  
 1635. Emily Haver, Portola 96122-2402  
 1636. Emily Scholl, Sacramento 95820-4263  
 1637. Emma DARMON, Noisy-le-sec 93130  
 1638. Emma Gardner, Petaluma 94953-2880  
 1639. Emma Louise Gilbride, Fairfield 94533-4656  
 1640. Emmett Culley, Paradise 95969-3743  
 1641. Emmylou Gutierrez, Fresno 93710-3913  
 1642. Enica Allen, Walnut Creek 94595-4527  
 1643. Enid Miller, Oak Park 91377-5556  
 1644. Enrico Verga, Seal Beach 90740-6473  
 1645. Enrique Dominguez, Downey 90242-4725  
 1646. Erany Barrow Pryor, Simi Valley 93063-2731  
 1647. Eric Bratcher, Hayward 94544-3521  
 1648. Eric Ciccone, Del Mar 92014-3578  
 1649. Eric Duggan, West Sacramento 95691-5967  
 1650. Eric Hamlin, Escondido 92027-3593  
 1651. Eric Hirshik, Fairfield 94534-7134  
 1652. Eric Jorgensen, Nevada City 95959-9722  
 1653. eric koenig, Novato 94945-1687  
 1654. Eric Mattei, Canoga Park 91304-3643  
 1655. Eric Morse, Culver City 90230-8471  
 1656. Eric Nilsson, Chico 95926-2859  
 1657. Eric Ramstrom, Redding 96002-5125  
 1658. Eric Sheppard, Encino 91316-4323  
 1659. Eric Tilenius, Hillsborough 94010-7233  
 1660. Eric Tyler Conrad, Morro Bay 93442-2435  
 1661. Erica Arrendondo, Sylmar 91342-4153  
 1662. Erica Costanzo, Oceanside 92058-1667  
 1663. Erica Rutherford, Oakland 94618-2345  
 1664. Erica Silverman, Los Angeles 90031-1416  
 1665. Erica Torell, Rohnert Park 94928-4073  
 1666. Erica Tyron, Claremont 91711-3818  
 1667. Erich Champion, Scotts Valley 95066-3701  
 1668. Erif Thunen, Albion 95410-0184  
 1669. Erik Kemper, Laguna Beach 92651-1519  
 1670. Erik Shank, Woodland 95695-2564  
 1671. Erika Lowry, Mill Valley 94941-3429  
 1672. Erika Parker, Antioch 94509-4355  
 1673. Erika Pringsheim, Lafayette 94549-3126  
 1674. Erin Foret, Martinez 94553-6121  
 1675. erin garcia, Sherman Oaks 91403-3414  
 1676. erin garcia, Tarzana 91356-1545

1677. Erin Millikin, San Diego 92154-4858
1678. Erin Stuart-Jennings, San Francisco 94112-1604
1679. Erna Strauch, South San Francisco 94080-3564
1680. Ernest Devaurs, West Sacramento 95691-4406
1681. Ernest Isaacs, Berkeley 94708-1633
1682. Ernest Stevens, Winterhaven 92283-9674
1683. Ernest Walters, Union City 94587-4331
1684. Ernestine Bonn, San Diego 92116-4039
1685. Ernie Walters, Union City 94587-4331
1686. Esmeralda Mendoza, Oxnard 93033-8520
1687. Estelle Moulton, Los Gatos 95031-0750
1688. Estelle Piper, Pleasanton 94566-6383
1689. Esther Jones, Laguna Niguel 92677-9200
1690. Ethan Krenzer, Trabuco Canyon 92679-3922
1691. Etta Robin, Bakersfield 93312-5824
1692. Eudora Dadpagouh, Riverside 92505-2914
1693. Eudora Tharp, Claremont 91711-4211
1694. Eugene Greenwood, Redwood City 94061-3872
1695. Eugene Majerowicz, View Park 90008-4821
1696. Eugenie Yaryan, Mill Valley 94941-2830
1697. Eujenia Nieto, Santa Clara 95051-3820
1698. Euripides Toro, Los Angeles 90041-3420
1699. Eva Anda, Santa Barbara 93111-2526
1700. EVA BOVENZI, San Francisco 94103-1224
1701. Eva Hofberg, Anaheim 92802-1748
1702. Eva Manus, Laguna Niguel 92677-7824
1703. Eva Suhr, Palo Alto 94306-1347
1704. Evan Jane Kriss, Sausalito 94965-2066
1705. Evan Jones, Carmichael 95608-2860
1706. Evan Kerrigan, San Francisco 94110-5209
1707. Evan McDermit, Fullerton 92832-1110
1708. Eve Duran, San Ysidro 92173-2517
1709. Eve Gordon, Tarzana 91356-1705
1710. Eve Lurie, OAKLAND 94608
1711. Eveline Blanchette, Atascadero 93422-1232
1712. Evelyn Greenwald, San Luis Obispo 93401-6026
1713. Evelyn Trevethan, Napa 94559-2133
1714. Evette Andersen, Grass Valley 95945-4813
1715. Ewa Pietraszak, Los Angeles 90058-1138
1716. Ewa Poczowska, Santa Monica 90405-3153
1717. Eystein Stenberg, San Francisco 94107-3657
1718. F Hammer, San Francisco 94123-3159
1719. Fabrice Habelski, Castro Valley 94546-2415
1720. Faith Herschler, Stanton 90680-4233
1721. Faith Straley, Quincy 95971-3012
1722. Farel Footman, Los Angeles 90065-3955
1723. Farid Alkoraishi, Campbell 95008-6261
1724. Farideh Kioumehr, Los Angeles 91403
1725. Farzad Ghazzagh, Novato 94949-5939
1726. Fawn Caldwell, Ramona 92065-4241
1727. Faye Gregory, Colton 92324-2734
1728. feliz nunez, Bermuda Dunes 92203-1147
1729. Felza Murray, Lomita 90717-0762
1730. Fernando Castrillon, Albany 94706-1164
1731. Fernando Matias, Sunnyvale 94087-1501
1732. Fia Perera, Pasadena 91101-3921
1733. Fiona Priskich, Darlington 90210
1734. Fiona Priskich, Swan View 90210-5432
1735. Flint Sheffield, Sacramento 95814-1469
1736. Florante Pascual, American Canyon 94503-1379
1737. Florence Korzin, Los Angeles 90068-3921
1738. Florence Mesker, Los Angeles 90035-2523
1739. Florene Rozen, Los Angeles 90027-3169
1740. Forest Frasier, Benicia 94510-3288
1741. Foster Boone, Etna 96027-9414
1742. Fran Farina, Santa Barbara 93111-1637
1743. Fran Watson, Spring Valley 91977-5227
1744. Frances Alet, Calabasas 91302-3408
1745. Frances Andrews, Davis 95616-3089
1746. Frances Blythe, Dixon 95620-2464
1747. Frances Elbik, Whittier 90605-3037
1748. Frances Garland, Carson 90746-0305
1749. Frances Logan, San Diego 92117-6101
1750. Frances Schutzer, Redwood City 94062-3053
1751. Frances Vanloan, Novato 94949-6250
1752. Frances Wesson, Hemet 92545-1111
1753. Frances Whiteside, Montclair 91763-2551
1754. Francesca Suzio, Richmond 94803-3230
1755. Francesca Wander, San Francisco 94121-3016
1756. Francie Rehwald, Malibu 90265-2115
1757. Francine Banda, South Pasadena 91030-3518
1758. Francine Crapuchettes, Altadena 91001-2843
1759. Francis Jansen, Santa Barbara 93101-8303
1760. Francisca Salazar, Los Angeles 90063-2916
1761. Francisco Koch, North Hills 91343-3720
1762. Francisco Martinez, San Francisco 94134-1340
1763. Franck de Chambeau, Rancho Mirage 92270
1764. Francoise Rothstein, Mill Valley 94941-1378
1765. Frank and Mary Vaz, Vista 92083-4727
1766. Frank B Anderson, San Pedro 90731-1840
1767. Frank B. Anderson, San Pedro 90731-1840
1768. Frank Chlarson, Costa Mesa 92627-2835
1769. Frank Dorf, Fair Oaks 95628-6664
1770. Frank Frank De Haan, Sun Valley 91352-2732
1771. Frank Kiernan, Olivehurst 95961-9370
1772. Frank Landis, San Diego 92129-4302
1773. Frank R Scott, Santa Ana 92706-3115
1774. Fred Cerrillo, Glendale 91208-2025
1775. Fred Dean, Los Angeles 90029-1130
1776. Fred Granlund, N Hollywood 91601-1723
1777. Fred Tashima, Los Angeles 90066-4914
1778. Freda Hofland, Los Altos Hills 94022-4239
1779. Frederick Hamilton, Rancho Cucamonga 91739
1780. Frieda Brock, Westlake Village 91362-3157
1781. Fritz Pinckney, Napa 94558-3756
1782. g martin, San Carlos 94070-4316
1783. G Victor, Kenwood 95452-1085
1784. Gabriel Chang, Bellflower 90706-5325
1785. Gabriel Gardner, Lakewood 90712-3413
1786. Gabriel Graubner, Santa Rosa 95404-8601

1787. Gabriel Kram, San Rafael 94903-3209  
1788. Gabriel Lautaro, Oakland 94610-5007  
1789. Gabriel Steinfeld, Oakland 94610-3861  
1790. Gabriela Delfin, Riverside 92507-2388  
1791. Gabriella Madriles, Los Angeles 90003-2252  
1792. Gabriella Nail, Los Angeles 90045-2748  
1793. Gaia Memmo, Los Angeles 90035  
1794. Gail Dunford, Poway 92064-3659  
1795. Gail Farina And Coe, Los Angeles 90066-3027  
1796. gail lytle, Turlock 95382-2849  
1797. Gail McMullen, Los Angeles 90027-3722  
1798. Gail Noon, San Pedro 90731-7149  
1799. Gail Reisman, Newport Beach 92663-4905  
1800. Gail Reutershan, Ben Lomond 95005-9627  
1801. Gail Sredanovic, Menlo Park 94025-6501  
1802. Gail Tinsley, Goleta 93117-1004  
1803. Gail Trace, Cayucos 93430-0241  
1804. Gail Weininger, Alameda 94501-1152  
1805. Gail Zans, Desert Hot Springs 92241-8282  
1806. Galen Abbott, San Francisco 94107-2703  
1807. Gariesue Gordon, Palmdale 93550-3983  
1808. Garrett Alden, Chico 95926-2774  
1809. Garrett Delorm, San Francisco 94118-1143  
1810. Gary Agliata, San Marcos 92078-1043  
1811. Gary Alderette, Santa Rosa 95401-5748  
1812. Gary and Seraphina Landgrebe, Soquel 95073  
1813. Gary Baxel, cathedral city 92234  
1814. gary baxel, Cathedral City 92234-3861  
1815. Gary Bea, Sunnyvale 94087-5262  
1816. Gary Beckerman, Santa Ynez 93460-9615  
1817. Gary Bippert, Simi Valley 93065-5725  
1818. Gary Charles, Long Beach 90801-3321  
1819. Gary Gall, Cambria 93428-2019  
1820. Gary Gates, Santa Cruz 95062-5119  
1821. Gary Jones, South San Francisco 94080-1329  
1822. Gary Kraus, Playa Del Rey 90293-8696  
1823. Gary Massing, San Francisco 94121-3321  
1824. Gary Reinoehl, Pioneer 95666-9350  
1825. Gary Searby, Windsor 95492-8163  
1826. Gary Thomsen, Newport Beach 92661-1409  
1827. Gary W Dolgin, Santa Monica 90402-1242  
1828. Gavrilah Wells, San Francisco 94114-3640  
1829. Gayle Kirma, Redondo Beach 90277-6509  
1830. Gayle Riggs, Palo Alto 94304-2600  
1831. Gayle Spencer, Menlo Park 94025-6315  
1832. Gaylen Stirton, Oakland 94619-1833  
1833. Geena Verna, Torrance 90505-2805  
1834. Gemma Geluz, Fairfield 94533-1469  
1835. Gena Pennington, Bayside 95524-9303  
1836. Gene Massion, Aptos 95003-9300  
1837. gene vidal, Redwood City 94061-2616  
1838. Genette Foster, Pasadena 91106-1312  
1839. Genevieve Hahn Kerr, San Anselmo 94960-1625  
1840. Genevieve Riber, San Diego 92103-1636  
1841. Genie Shenk, Solana Beach 92075-1315  
1842. Geoff Quinsey, Chico 95926-1756  
1843. Geoff Regalado, Burbank 91503-4183  
1844. Geoffrey Eargle, Sacramento 95841-2066  
1845. Geoffrey Gallegos, San Francisco 94131-2808  
1846. George Anderson, Murrieta 92562-5543  
1847. GEORGE BUDD, Los Angeles 90035-3506  
1848. George Chadderton, San Ramon 94583-1265  
1849. George Cleveland, Santa Clara 95051-5626  
1850. George Dean, Grass Valley 95945-5684  
1851. George Forrester, Bristol 90210  
1852. George Fourchy, Fairfield 94533-9520  
1853. George Lindelof, Carpinteria 93013-2425  
1854. George Loeb, Three Rivers 93271-9700  
1855. George Mageles, Saratoga 95070-1690  
1856. George Moschonas, Los Angeles 90034-3133  
1857. George Nickle, West Hollywood 90046-5412  
1858. George Royer, Los Gatos 95032-3572  
1859. George Ruiz, San Carlos 94070-2220  
1860. George Schneider, San Diego 92105-5153  
1861. George Shaker, Cathedral City 92234-6511  
1862. George Wood, Ukiah 95482-8340  
1863. Georgette M Petrone, Culver City 90232-3126  
1864. Georgia Carver, Rancho Cordova 95670-3636  
1865. Georgia Goldfarb, Malibu 90265-5359  
1866. Georgia Gruver, Hayward 94542-1639  
1867. Georgia Labey, La Mesa 91942-2174  
1868. Gerald Bender, Santa Rosa 95409-3858  
1869. gerald frink, Sacramento 95814-5950  
1870. Gerald Orcholski, Pasadena 91104-3427  
1871. Gerald Shaia, Sun Valley 91352-4005  
1872. Gerald Telep, Rancho Cordova 95742-7766  
1873. Geraldine May, Creston 93432-9773  
1874. Gerda Rasker, Oakland 94611-2133  
1875. Gerri Battistessa, Petaluma 94952-4115  
1876. Giina Felicetta, North Hollywood 91602-2012  
1877. Gil Gaus, Kings Beach 96143-1252  
1878. Gil Leib, Santa Monica, 90403  
1879. Gil Varon, Santa Barbara 93101-3210  
1880. Gilad Lumer, Marina Del Rey 90292-5952  
1881. Gilberto Mello, Los Angeles 90068-2016  
1882. Gilles poupardin, San Francisco 94117-1423  
1883. Gillian Cornelius, Studio City 91604-5208  
1884. Gillian Moreland, San Diego 92128-2953  
1885. Gina Dowden, San Marcos 92078-4303  
1886. Gina Gatto, Castro Valley 94546-2731  
1887. Gina Luzzi, San Francisco 94127-2219  
1888. Gina Matteucci, Sacramento 95822-2922  
1889. Gina Mori, Arroyo Grande 93420-3745  
1890. Gina Pearlin, Santa Cruz 95062-2420  
1891. Ginabella Mallari, Huntington Beach 92649-3696  
1892. Ginger Schedler, Fresno 93728-1634  
1893. Giovanni Su, Los Angeles 90063-3233  
1894. Gisela Pimentel, San Pedro 90731-3014  
1895. Gisela Rivera, South Gate 90280  
1896. GL Caviglia, Morgan Hill 95038-1954



1897. Gladys Eddy-Lee, San Diego 92115-7009
1898. Glen Williams, Weed 96094-9225
1899. glenda coker, Fresno 93726-1460
1900. Glenn Karnofsky, Carnelian Bay 96140-0667
1901. Glenn Mullins, Buena Park 90620-1269
1902. Glenn Siegfried, Arcata 95521-9006
1903. Gloria Aguirre, Castaic 91384-2518
1904. Gloria Albert, Santa Monica 90403-2950
1905. Gloria Barba, Sun Valley 91352-3043
1906. Gloria Berger, San Diego 92109
1907. Gloria Carrillo, San Diego 92167-0331
1908. Gloria Hollahan, Lompoc 93436-7848
1909. GLORIA JOHNSON, Vista 92084-3513
1910. gloria manjarrez, Orland 95963-1930
1911. Gloria Mejia, Hemet 92543-8820
1912. Gloria Naisbitt, Santa Rosa 95404-6178
1913. Gloria Valoris, Sacramento 95841-2865
1914. Glorianna Llight, Santa Barbara 93140-4212
1915. Golda Michelson, Fairfax 94930-1509
1916. Gonzalo Castillo, West Sacramento 95691-5823
1917. Goran Markovic, Seaside 93955-4105
1918. Gordon Gerbitz, Santa Barbara 93101-3478
1919. Gordon Gilmore, Concord 94520-5452
1920. Gordon Kauhanen, Monterey 93940-4936
1921. Grace Babashoff, Big Bear Lake 92315-3409
1922. Grace Feldmann, Santa Barbara 93105-9785
1923. Grace Huenemann, San Francisco 94107-2750
1924. grace lee, Los Gatos 95032-3483
1925. Gracie Hind, Long Beach 90815-1313
1926. Graciela Huth, Los Angeles 90045-3707
1927. Grady Hunt, San Mateo 94403-1415
1928. Graham Bottoms, Redwood City 94063-4302
1929. Graham Douglas, Brisbane 94005-1302
1930. grant hueth, Santa Cruz 95062-2959
1931. Grant Miller, Foothill Ranch 92610
1932. Grant Power, Los Angeles 90026-4134
1933. Grant Rich, Oakland 94609-2962
1934. Green Greenwald, Sebastopol 95472-3435
1935. Greg & Laurie Schwaller, Three Rivers 93271
1936. Greg Baskin, Chico 95926-3750
1937. Greg Denari, Saratoga 95070-5937
1938. Greg Fisch, San Diego 92130-6754
1939. Greg Pennington, San Francisco 94109-6178
1940. Greg Rosas, Castro Valley 94546-3653
1941. Greg Taylor, San Francisco 94107-1847
1942. Greg Winton, Moreno Valley 92557-8554
1943. Gregg Johnson, San Jose 95126-5006
1944. Gregg Silk, San Mateo 94402-1542
1945. Gregg Silk, San Mateo 94402-1555
1946. Gregg Sparkman, Palo Alto 94301-2437
1947. gregory andronaco, Ukiah 95482-4712
1948. Gregory Fite, Castro Valley 94546-1406
1949. Gregory Martin, Healdsburg 95448-3551
1950. greta langmead, Beverly Hills 90212-3615
1951. Gretchen Antill, Novato 94949-6642
1952. Gretchen Cooper, San Diego 92128-2098
1953. Gretchen Sauer, San Leandro 94577-3023
1954. Gunilla Karlsson, PhD. , Oak Park 91377-4820
1955. Guy Clark, Los Gatos 95033-8990
1956. Guy White, North Hollywood 91601-2817
1957. Guy Zahller, Aptos 95003-4577
1958. Gwen Bedient, West Sacramento 95691-5818
1959. Gwendolyn Dashiell, Culver City 90230-5010
1960. Gwyn Drischell, Tujunga 91042-2939
1961. Gwyneth Perrier, San Francisco 94121-3517
1962. H Clarke Gentry, Oakland 94609-1346
1963. H Coetzee, La Canada 91011-2459
1964. H Gabriel Larios, Whittier 90602-2621
1965. H Leff, San Francisco 94108-1011
1966. H Thomson, Long Beach 90802-4718
1967. Hakim Aammar, Antony 92160
1968. Hale Tokay, Oakland 94602-4051
1969. Hanin Alhassan, El Segundo 90245-2077
1970. Hank Perera, Ontario 91764-4649
1971. hanna parsano, Capitola 95010-2410
1972. Hannah MacLaren, Altadena 91001-5280
1973. Hannah Mitchell, Sacramento 95818-3901
1974. Hannelore McCrumb, San Jose 95112-3428
1975. Hans Bertsch, Imperial Beach 91932-2543
1976. Harlan Lebo, La Mirada 90637-0614
1977. Harley Sebastian-Lewis, Sacramento 95823-3043
1978. Harold Hedelman, Woodacre 94973
1979. HAROLD MANN, San Jose 95124-1860
1980. Harold Wakefield, Woodland Hills 91367-3545
1981. Harriet Harvey-Horn, Los Gatos 95032-5003
1982. Harriet Sherry, Covina 91723-1812
1983. Harry Blumenthal, Eureka 95501-3304
1984. Harry Brass, Berkeley 94706-2412
1985. Hayley Scott, Lafayette 94549-4631
1986. Heather Ablog, El Dorado Hills 95762-9552
1987. Heather Berk, Fountain Valley 92708-6858
1988. Heather Busch, Petaluma 94952-2552
1989. Heather Cornish, San Francisco 94122-2867
1990. Heather Day, Livermore 94550-2305
1991. Heather Grigsby, Citrus Heights 95610-3149
1992. Heather Guentzel Frank, Los Angeles 90048
1993. Heather Hall, Westlake Village 91361-2113
1994. Heather Lutz, Dana Point 92629-4308
1995. Heather Matteson, San Luis Obispo 93405-6326
1996. heather rider, Los Angeles 90049
1997. Heather Rudin, Lancaster 93536-5860
1998. Heather Vollstedt, Carmichael 95608-3675
1999. Hector Gonzalez, Los Angeles 90015-1571
2000. Hector Parra, Mountain View 94043-2548
2001. Hedvig Fejerne, Mountain View 94043-3057
2002. Heidi Bourne, Arcata 95518-4313
2003. Heidi Collins, La Mesa 91942-5018
2004. Heidi Dauwalter, Simi Valley 93065-5912
2005. Heidi Ellis, Los Angeles 90036-2854
2006. Heidi Holland, Santa Cruz 95062-4812

2007. Heidi McGough, Santa Cruz 95060-5339
2008. Heidi Nurse, Fair Oaks 95628-3435
2009. Heidi Palmer, Rancho Cucamonga 91739
2010. Heidi Wilcox, San Francisco 94121-3106
2011. Heidi Ziegler, Manhattan Beach 90266-5111
2012. Heike Behl, San Diego 92109-3696
2013. Helen Bacon, San Rafael 94901-1204
2014. Helen Bruner, Mill Valley 94941-2956
2015. Helen Cooluris, San Francisco 94127-1304
2016. Helen Crawford, Nevada City 95959-2922
2017. Helen Doherty, Thousand Oaks 91361-5303
2018. Helen Gallagher, Sacramento 95826-2128
2019. Helen Goldstein, Santa Rosa 95404-2563
2020. Helen Gordon, Woodside 94062-4534
2021. Helen Mehoudar, Berkeley 94707-1538
2022. Helen Miller, Van Nuys 91401-2115
2023. Helen Prusiner, San Francisco 94123-4620
2024. Helen Ritenour, Porter Ranch 91326-1632
2025. Helena Wilcox, Stockton 95204-2702
2026. Helene Carol Meeks, Hayward 94545-1508
2027. Helga S, Victorville 92392-7988
2028. Henry Narve Jr, Thousand Oaks 91358-1908
2029. Henry Narve, Thousand Oaks 91358-1908
2030. Henry Sanchez, Ojai 93023-9514
2031. Henry Weinberg, Santa Barbara 93110-2032
2032. Herb Stern, San Diego 92106-1104
2033. Herbert C ZIEGLER, YUCAIPA 92399-4612
2034. Herbert C Ziegler, Yucaipa 92399-4612
2035. Herman Chaney, Oakland 94612-4052
2036. Hieu Buu, Stockton 95209-2102
2037. Hilarey Benda, Los Angeles 90035-1418
2038. Hilary Emberton, Grass Valley 95945-7317
2039. Hilda Ruvalcaba, Coachella 92236-2923
2040. Hildy Roy, Magalia 95954-0886
2041. Hillary Kantmann, Oakland 94608-1205
2042. Hillary Ostrow, Encino 91316-1013
2043. Hoang Vu, Milpitas 95035-3907
2044. Hollis Reed, San Francisco 94134-1022
2045. Holly Burgin, Van Nuys 91405-1435
2046. Holly Chadwin, Santa Barbara 93110-1470
2047. Holly Dupre, Chula Vista 91913-1659
2048. Holly Quinn, Arcata 95521-6552
2049. Hope Ashlley, San Francisco 94105-2009
2050. Hope Orozco, Santa Fe Springs 90670-2847
2051. Howard Belove, Petaluma 94952-2409
2052. Howard Cohen, Campbell 95008-4600
2053. Howard Eisenberg, San Mateo 94402-3334
2054. Howard Holko, San Anselmo 94960
2055. Howard Judkins, Altadena 91001-3206
2056. Howard Lange, San Diego 92129-2250
2057. howard mainhart, Arroyo Grande 93420-4118
2058. Howard Miller, Ventura 93003-1319
2059. Howard Wilshire, Sebastopol 95472-9459
2060. Hugh Lawrence, Carlsbad 92009-8926
2061. Hugh Moore, Los Angeles 90064-4848
2062. Huguette Moran, Long Beach 90815-4728
2063. Hyla Wetherill, Los Angeles 90028-6041
2064. Hyun Lee, Irvine 92618-3976
2065. Ian Carlon, San Jose 95116-2513
2066. Ian Haddow, San Francisco 94131-3040
2067. Ian Kent, Kirkwood 95646
2068. ian' lin, Chino Hills 91709-1760
2069. Ian Murray, Santa Rosa 95405
2070. Ian Nelson, Santa Rosa 95403-1767
2071. Ian Price, Belmont 94002
2072. Ian Rose, Orange 92866-1041
2073. Ian Silverstein, Pacific Palisades 90272-1969
2074. Ian Williams, Ojai 93023-2309
2075. Ida & Bruce Raby, San Jose 95125-1802
2076. Idell Burden, Imperial 92251-9619
2077. Ilana Bar-David, San Francisco 94121-2427
2078. Ileana Labergere, San Francisco 94103-2754
2079. Ilene Atkins, Studio City 91604-3444
2080. Ilona Geller, Encino 91316-3400
2081. Ilona Reitzner, Santa Rosa 95401-5861
2082. Imogene Blatz, Saratoga 95070-3331
2083. Inge Wagner, Los Angeles 90020-2055
2084. Ingeborg MacKay, Petaluma 94954-4431
2085. Ingrid Brewer, Westlake Village 91362-7006
2086. Ingrid Skei, Thousand Oaks 91362-1811
2087. Ingrid woods, Mill Valley 94941-1519
2088. Inna Gergel, Granada Hills 91344-3510
2089. Irene Dillon, San Francisco 94117-3715
2090. Irene Jimenez, indio 92201
2091. Irene Kang, Los Angeles 90066-3040
2092. Irene Kang, Los Angeles 90066-6439
2093. Irene Lutz, Canyon Cntry 91351-1168
2094. Irene Nakamura, Arleta 91331-5722
2095. Irene Salinas, Hanford 93230-7630
2096. Irene Snavely, Covina 91724-3447
2097. Irma Lopez, Reseda 91335
2098. IRVING Shapiro, Cypress 90630-3052
2099. isaac Wingfield, Santa Rosa 95403-1948
2100. Isabel Bauer, Redwood City 94062-1034
2101. Isabel Freeman, Topanga 90290-3448
2102. Isabel Molloy, San Francisco 94121-3427
2103. Isabel Obrien, Palo Alto 94303-3702
2104. Isabella La Rocca, Berkeley 94703-6003
2105. Isaiah Rodriguez, San Jose 95122-3906
2106. Ismael Macias, Sacramento 95825-6610
2107. Ivonne Walters, Redlands 92374-6259
2108. J Agata, Sebastopol 95472
2109. J Crawford, San Diego 92105-5153
2110. J Davis, San Francisco 94102-4000
2111. J Duerr, Sacramento 95831-1840
2112. J Mac, topanga 90290
2113. J P Perino, Novato 94945-1607
2114. J W White, LOS ANGELES 90045
2115. Jaci Springfield, San Diego 92116-2211
2116. Jack Coombes, Sacramento 95814-4334

2117. Jack Mahrt, Morro Bay 93442-2944  
2118. Jack Nounnan, Trinidad 95502  
2119. Jack O, Laguna Beach 92651-2056  
2120. Jack Preston Marshall, Barstow 92311-9747  
2121. Jackie Bear, Los Angeles 90048-4407  
2122. Jacklyn Lowe, San Diego 92115-6817  
2123. Jaclyn Palmer, Pasadena 91103-3301  
2124. Jacob Davis, Sonoma 95476-4206  
2125. Jacque Gamboa, La Jolla 92037-7515  
2126. Jacquelin Sonderling, Los Angeles 90028  
2127. jacqueline kramer, Sonoma 95476-6264  
2128. Jacqueline Meyer, Foster City 94404-1431  
2129. Jacqueline Serman, Ventura 93003-4464  
2130. Jacqueline Van Sinderen, Lafayette 94549-2221  
2131. Jacqueline Walburn, Garden Grove 92845-3018  
2132. Jacqueline Wells, Calabasas 91302-1828  
2133. Jacqueline Wright, Los Angeles 90041  
2134. Jacquelyn Evans, Berkeley 94708-1204  
2135. Jacquelyn Roberts, Tehachapi 93561-8581  
2136. Jacquelynn Avakian, Los Alamitos 90720-2221  
2137. Jacqui Bradshaw, Tehachapi 93581-1896  
2138. Jacque Forester, Encinitas 92024-6540  
2139. Jade de la Cruz, Windsor 95492-8060  
2140. Jaianand Sethee, Cardiff By The Sea 92007-1806  
2141. Jake Schwartz, Petaluma 94952-2483  
2142. James Allison, Carpinteria 93013-1829  
2143. James Armbruster, Escondido 92026-3934  
2144. James Begg, Truckee 96161-2154  
2145. James Bergantino, Bakersfield 93313-6110  
2146. James Carpenter, Oakland 94619-2817  
2147. James Cooper, Ojai 93023-2961  
2148. James Cooper, Pebble Beach 93953-2747  
2149. James Dawson, Davis 95618-6741  
2150. James Hammonds, Bonita 91902-1019  
2151. James Higdon, Benicia 94510  
2152. James Inskeep, Fremont 94555-2867  
2153. James Jones, bethel island 94511-2259  
2154. James Kirks, Chico 95973-1076  
2155. James Littlefield, Aptos 95003-4322  
2156. James Lowman, San Bernardino 92410-4717  
2157. JAMES MALOT, Davis 95616-7514  
2158. James Masi, San Francisco 94158-1593  
2159. James Naprawa, Walnut Creek 94596-5423  
2160. James Nelson, Carmichael 95608-3402  
2161. James Noordyk, San Diego 92109-2802  
2162. James Perkins, Los Angeles 90037-4029  
2163. James Petrone, Los Angeles 90027-1302  
2164. James Price, Santa Monica 90404-1767  
2165. James Putnam, Santa Clara 95051-6717  
2166. James Rees, Castro Valley 94546-4517  
2167. James Roberts, Sugarloaf 92386-0819  
2168. James Ryder, Oakland 94618-1039  
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2177. Jamie Chen, Murrieta 92562-5961  
2178. Jamie Clark, San Francisco 94108-1514  
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2182. Jamie Swanson, Los Angeles 90039-1523  
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2222. Janet Aguilera, Daly City 94014-3639  
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2226. Janet Bowden, Culver City 90232-3452

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 2314. Jeff Gatesman, Playa Del Rey 90293-8471  
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 2335. JENIFER SMITH, Costa Mesa 92627-4431

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 2340. Jennifer Boelter, Merced 95340-0727  
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 2342. jennifer bradley, Santa Monica 90404-4636  
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 2351. Jennifer Everett, Napa 94559-4146  
 2352. Jennifer Griffin, Redlands 92373-6745  
 2353. Jennifer Hayes, Modesto 95350-1716  
 2354. Jennifer Huffsmith Shamberger, Indio 92201  
 2355. Jennifer Hughes, Los Altos Hills 94022-1812  
 2356. Jennifer Jerlstrom, Anaheim 92804-1663  
 2357. Jennifer Johnsen, Walnut Creek 94595-3551  
 2358. Jennifer Kim Zeller, Pacific Palisades 90272  
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 2360. Jennifer Kizziah, Los Alamos 93440  
 2361. Jennifer McAdam, Mission Viejo 92692-1039  
 2362. Jennifer O'Neal, Studio City 91604-2406  
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 2367. Jennifer Sarff, San Diego 92103-3782  
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 2369. Jennifer Strong, South Pasadena 91030-3110  
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 2372. Jennifer Weill, San Pablo 94806-1161  
 2373. Jenny Collins, Berkeley 94703-1802  
 2374. Jenny England, San Carlos 94070-2829  
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 2382. Jeremy Lyons, West Hollywood 90046-5934  
 2383. Jeremy Spencer, Pacifica 94044-3318  
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 2389. Jerry Horner, Walnut Creek 94595-1234  
 2390. Jerry Hudgins, Point Reyes Station 94956-1408  
 2391. jerry jeter, San Francisco 94114-2857  
 2392. Jerry Miller, Union City 94587-3680  
 2393. Jerry Oliver, Sylmar 91342-5503  
 2394. Jerry Sullivan, Mount Shasta 96067-9141  
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 2397. Jerry Whitley, Laguna Hills 92653  
 2398. Jes Gildea, San Clemente 92673-3111  
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 2401. Jesse Goldstein, Santa Barbara 93105-4268  
 2402. Jesse Turner, San Francisco 94117-3052  
 2403. Jesse Wiley, San Ramon 94583-3228  
 2404. Jessica Bernard, Emeryville 94608-2941  
 2405. Jessica Condon, Fountain Valley 92708-4708  
 2406. Jessica Croxton, Venice 90291-2806  
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 2416. Jessica Likens, Buena Park 90620-3156  
 2417. Jessica Parlanti, Mountain View 94040-1692  
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 2423. jewel huckaby, Sacramento 95833-1509  
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 2427. Jill Clemence, Torrance 90505-7045  
 2428. Jill Clemence, Walnut 91789-2706  
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 2431. Jill Miotke, Costa Mesa 92627-5527  
 2432. Jill Rian, Oakland 94602-1629  
 2433. Jill Sherwood, Belvedere Tiburon 94920-1807  
 2434. Jill Wiechman, Newbury Park 91320-3513  
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 2441. Jim Gray, Hemet 92544-7344  
 2442. Jim Hanley, Santa Rosa 95407-7710  
 2443. jim lennon, Arcata 95521-5332  
 2444. Jim Leske, North Hollywood 91606-2729  
 2445. Jim Littlefield, Aptos 95003-4322

2446. Jim Phillips, Sonoma 95476-7324  
 2447. Jim Simpson, Modesto 95351-5117  
 2448. Jim Wilson, Placerville 95667-7915  
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 2450. Jo Ann Frisch, Pleasanton 94566-6372  
 2451. Jo Ann Kiva, Pasadena 91107-1606  
 2452. Jo Ann Toro, Redding 96001-8730  
 2453. Jo Anne Hall, San Rafael 94903-3867  
 2454. Jo Anne Welsch, Berkeley 94703-1040  
 2455. Jo Baxter, Santa Monica 90402-1619  
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 2458. Jo Godinho, Fortuna 95540-9553  
 2459. Jo Quinlivan, Oakland 94619  
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 2481. Joan Rost, San Francisco 94109-2998  
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 2484. Joan Sitnick, Encino 91436-3836  
 2485. Joan Speer, Banning 92220-5410  
 2486. Joan Walker, Bishop 93514-3035  
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 2535. Joel Meza, San Francisco 94121-0144  
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 2548. John Cornish, Concord 94521-4004  
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 2553. John Dellasala, Newbury Park 91320-4515  
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 2555. John Dutton, Santa Barbara 93110-1504

2556. John Edman, Santa Clara 95051-7500  
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 2569. John Hauschild, Auburn 95603-4921  
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 2579. john martinez, Lomita 90717-1514  
 2580. John Mcallister, Grass Valley 95945-6402  
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 2582. John Nowak, Santa Ana 92704-3726  
 2583. John Nyomarkay, N Hollywood 91601-5657  
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 2585. John Ota, Alameda 94501-1509  
 2586. John Palafoutas, Los Angeles 90038-5001  
 2587. John Pasqua, Escondido 92025-5005  
 2588. John Pederson, Novato 94947  
 2589. john pennell, Modesto 95351-2139  
 2590. John Price, San Jose 95128-1127  
 2591. John Rowell, Los Gatos 95032-5106  
 2592. John Ryan, Santa Cruz 95062-4058  
 2593. John Sefton, Trabuco Canyon 92678-0714  
 2594. John Siebel, Murrieta 92562-3017  
 2595. John Tansley, San Francisco 94133-0351  
 2596. John Unger,, Saugus 91350-1990  
 2597. John Van Straalen, Petaluma 94952-2752  
 2598. John Varga, Huntington Beach 92648-5326  
 2599. John Wallack, Santa Rosa 95403-1383  
 2600. John Weate, Vista 92081-6331  
 2601. John Weaver, Fremont 94536-5508  
 2602. John Whitney, Los Angeles 90069-1316  
 2603. John Wiesner, Castro Valley 94546-0674  
 2604. John Zimmermann, Long Beach 90803-8031  
 2605. johna alexander, Chico 95926-5120  
 2606. Jolene Edwards, Grass Valley 95945-4608  
 2607. Jon Anderholm, Cazadero 95421-9580  
 2608. Jon Bazinet, San Lorenzo 94580-2444  
 2609. Jon Bleyer, San Diego 92107-1811  
 2610. Jon Cotham, Ojai 93023-3126  
 2611. Jon Culbertson, San Anselmo 94960-2261  
 2612. Jon Darke, LA 90012-3712  
 2613. Jon Grutman, Los Angeles 90036-5524  
 2614. Jon Porter, Md, Rossmore 90720-4740  
 2615. Jon Povill, Topanga 90290-3538  
 2616. Jonathan Baty, Redlands 92373-6904  
 2617. Jonathan Boorstin, Studio City 91604-4029  
 2618. Jonathan Chu, Fremont 94539-4440  
 2619. Jonathan Clark, Paradise 95969-3001  
 2620. Jonathan Eden, Berkeley 94707-1520  
 2621. Jonathan Eisler, Quincy 95971  
 2622. Jonathan Sampson, Santa Rosa 95404-2260  
 2623. Jonel Lancaster, Anaheim 92804-5511  
 2624. JONNY Pickles, MONTRAY PARK 91755  
 2625. Jonothan Woodward, Alameda 94501-2392  
 2626. Jordan Hashemi-Briskin, Palo Alto 94306-2512  
 2627. Jordan Mack, Galt 95632-3425  
 2628. jordan neiman, Los Angeles 90068-2415  
 2629. Jordan Winehouse, Leeds 94111  
 2630. Jose De Cecco, San Francisco 94114-1105  
 2631. José Espinosa, San Francisco 94110-1119  
 2632. Jose Garcia Davis, Los Angeles 90027-4753  
 2633. Jose Mendez, Monterey Park 91755-3439  
 2634. Jose Vempilly, Fresno 93701  
 2635. Joseph & Kathryn Yarosevich, Chico 95973-9771  
 2636. Joseph & Mrs Kathryn Yarosevich, Chico 95973  
 2637. Joseph A Sandoval, Monterey Park 91754-6001  
 2638. Joseph Boone, San Luis Obispo 93401-2606  
 2639. Joseph Bourque, Martinez 94553-6624  
 2640. Joseph Caballero, San Francisco 94114-2016  
 2641. Joseph Dadgari, Los Angeles 90049-8205  
 2642. Joseph Kotzin, Los Angeles 90036-4414  
 2643. Joseph Levinson, Berkeley 94703-1832  
 2644. Joseph Pluta, Bakersfield 93301-4931  
 2645. Joseph Ramirez, Los Angeles 90064-4112  
 2646. JOSEPH REEL, Pacific Grove 93950-6066  
 2647. Joseph Rosales, Ontario 91761-0330  
 2648. Joseph Szabo, Los Angeles 90045-4332  
 2649. Joseph Vella, Aptos 95003-2708  
 2650. Josephine Gold, San Diego 92128-5621  
 2651. Josh Buffon, Goleta 93117-3048  
 2652. Josh Chesler, Culver City 90230-5544  
 2653. Josh Zhu, San Diego 92130-3407  
 2654. Joshua Allen, Santa Barbara 93103-2426  
 2655. Joshua Debbs, Sacramento 95823-5057  
 2656. Joshua Dubansky, Fresno 93704-6143  
 2657. Joshua Wong, Tustin 92782-6511  
 2658. Josiane Pettitt, Vista 92084-7234  
 2659. Jossy Zamora, Rialto 92376-6003  
 2660. Joy Monahan, Riverside 92506-7584  
 2661. Joy Turlo, Redondo Beach 90277-5811  
 2662. Joyce Acda, Hayward 94542-1219  
 2663. Joyce Brogger, Concord 94521-3531  
 2664. Joyce Chang, Los Altos 94024-7036  
 2665. Joyce Cochran, San Francisco 94118-2826

2666. joyce heyn, Poway 92064-4071  
 2667. Joyce Humphrey, Half Moon Bay 94019-0055  
 2668. Joyce Lane, San Diego 92115-5444  
 2669. Joyce Lavey, San Francisco 94110-7413  
 2670. Joyce Ownbey, Sacramento 95826-2936  
 2671. Joyce Towers, Ventura 93003-0384  
 2672. Joyce Vega, Monterey Park 91754-3920  
 2673. Juan Lora, Los Angeles 90046-4038  
 2674. Juanita Lackey, Fresno 93720-3605  
 2675. Jud Woodard, Sutter Creek 95685-9632  
 2676. Jude Clark Warnisher, Los Osos 93402-3810  
 2677. Jude Lotz, Burbank 91505-1607  
 2678. Judeen Schneider, Long Beach 90804-3209  
 2679. Judi Kaminski, Mission Viejo 92692-1645  
 2680. judi martin, oaklawn 94619  
 2681. Judi Naue, Manteca 95337-4337  
 2682. Judith Aka Rose Wemmer, Los Angeles 90045  
 2683. Judith Arrieta, Carlsbad 92008-2782  
 2684. Judith Barney, Solana Beach 92075-1646  
 2685. Judith Blick, Del Mar 92014-3241  
 2686. Judith Collins, Half Moon Bay 94019-2354  
 2687. Judith Edwards, Mendocino 95460-1187  
 2688. Judith Gage, Soquel 95073-2630  
 2689. Judith Goe, San Diego 92102-1228  
 2690. Judith Gordon, San Francisco 94133-3756  
 2691. Judith Hall, Pacifica 94044-2148  
 2692. Judith Justin, Fallbrook 92028-9373  
 2693. Judith Kliban, Corte Madera 94976-0608  
 2694. Judith Little, Arcata 95521-9208  
 2695. Judith Mantell, Brentwood 94513-8087  
 2696. Judith Patt, Victoria, BC, voting absentee  
 Berkeley 94705  
 2697. Judith Schumacher-Jennings, Walnut Creek  
 94595-3012  
 2698. judith sloane, Valley Center 92082-5016  
 2699. Judith Stone, Sebastopol 95472-9578  
 2700. Judith Van Herik, Grass Valley 95949-7737  
 2701. Judith Wright, Sacramento 95816-4821  
 2702. Judy Alexandre, Ventura 93004-2304  
 2703. Judy Burlison, Red Bluff 96080-3041  
 2704. judy dutil, Los Gatos 95033-9704  
 2705. Judy Ecklund, La Jolla 92037-0014  
 2706. Judy Howell, Jamestown 95327-9674  
 2707. Judy Ilan, Berkeley 94709  
 2708. Judy Jackson, Berkeley 94708-1608  
 2709. Judy Johnson, Placerville 95667-4929  
 2710. Judy Ludwig, Huntington Beach 92646-5453  
 2711. Judy Lukasiewicz, Santa Cruz 95065-9789  
 2712. Judy Malouf, Dana Point 92629-3703  
 2713. Judy Miller, Santa Barbara 93109-1414  
 2714. Judy Reinert, Santa Clarita 91355-3717  
 2715. Judy Rydburg, Laguna Niguel 92677-5918  
 2716. Judy Smith, Moreno Valley 92555-2002  
 2717. Judy Trahan, Oakland 94611-5033  
 2718. Judy Utvich, Los Angeles 90048-3530  
 2719. Judy Willhoite, Coalinga 93210-1420  
 2720. Julia Broad, Anaheim 92804-3435  
 2721. Julia Conklin, Pasadena 91107-1800  
 2722. Julia McFarland, Mountain View 94043-2994  
 2723. Julia Rinaldi, Santa Rosa 95407-6680  
 2724. Julia Ronlov, San Diego 92103-4813  
 2725. Julia Russell, Roseville 95747-5863  
 2726. Julia Schroter, Anaheim 92805-4463  
 2727. Julia Stander, Van Nuys 91411-3019  
 2728. Julia Toney, Grass Valley 95945-8508  
 2729. Julia Vetrie, Canyon Country 91387-6318  
 2730. Julian Yerena Jr, Parlier 93648-2706  
 2731. Juliana Linssen, San Jose 95125-1650  
 2732. Juliann Berman, Redwood City 94061-4228  
 2733. Julie Beer, Palo Alto 94306-1518  
 2734. Julie Heath Elliott, Los Angeles 90064-3620  
 2735. Julie Lane, Sebastopol 95472-5819  
 2736. Julie Lawyer, Benicia 94510-1434  
 2737. Julie LIKHT, Culver City 90230-8105  
 2738. Julie Neidich, Ladera Ranch 92694-0890  
 2739. Julie Nelson, North Hollywood 91601-4822  
 2740. Julie Osborn, Sacramento 95835-1926  
 2741. Julie Pritikin, Granada Hills 91344-3032  
 2742. Julie Ries, Topanga 90290-4410  
 2743. Julie Schisler, Concord 94518-1726  
 2744. Julie Smith, Los Osos 93402-4006  
 2745. Julie Svendsen, Burbank 91505-3837  
 2746. Julie Waddell, San Diego 92131-4750  
 2747. Julie Wright, Los Angeles 90039-3409  
 2748. juliet hawk, San Diego 92116-1333  
 2749. Juliet Holmes, Roseville 95747-6768  
 2750. Juliet Schmitt, Carlsbad 92010-7040  
 2751. June Ehemann, Duarte 91010-3225  
 2752. K B, West Hollywood 90069  
 2753. K Nilsen, Ben Lomond 95005  
 2754. K R, Commerce 90040-1489  
 2755. K Silvey, Martinez 94553-5344  
 2756. K Strasser, Martinez 94553-3369  
 2757. Ka Man Lee, Los Angeles 90025-4370  
 2758. Kai Bello, Huntington Beach 92647-7926  
 2759. Kamela Proulx, Los Osos 93402-2516  
 2760. Kara Vesely, Long Beach 90805-2341  
 2761. kara wenrich, North Hollywood 91601-3035  
 2762. Kare Nyne, Oakland 94601-4354  
 2763. Kareela Collins, Twin Bridges 95735-0992  
 2764. Karen and Allen Perry, Yucca Valley 92284-1703  
 2765. Karen Bates, Fresno 93722-4761  
 2766. karen Bolla, Alameda 94501-1055  
 2767. Karen Brant, San Francisco 94117-4320  
 2768. Karen Christensen, Malibu 92677  
 2769. Karen Christie, Topanga 90290-3555  
 2770. Karen Cooksey, Camarillo 93010-2014  
 2771. Karen Davies, Fresno 93704-1813  
 2772. Karen Donaldson, Grass Valley 95945-3215  
 2773. Karen Gordon, Albany 94706-1692



2774. Karen Gurtler, Pleasanton 94566-6037  
 2775. Karen Hansen, Burbank 91504-3924  
 2776. Karen Hastings, Santa Barbara 93109-1112  
 2777. Karen Hellwig, Los Angeles 90056-1737  
 2778. Karen Hildebrand, Santa Cruz 95060-5069  
 2779. Karen Jacques, Sacramento 95811-7105  
 2780. Karen Keefer, Redwood City 94061-2625  
 2781. Karen Kone, Redding 96002-0824  
 2782. karen krulevitch, Carpinteria 93013-1206  
 2783. Karen Lautsch, San Mateo 94402-2014  
 2784. Karen Lockwood, La Jolla 92037  
 2785. Karen Mayer, Eureka 95503-9776  
 2786. Karen Miner, El Dorado Hills 95762-7512  
 2787. Karen Nagano, Napa 94558-4324  
 2788. Karen O'Rourke, Canoga Park 91304-1005  
 2789. Karen Parlette, Eureka 95501-5626  
 2790. Karen Patterson, Oakdale 95361-2760  
 2791. Karen Phelps, Capitola 95010-2104  
 2792. Karen Piotrowski, Fairfield 94533-7772  
 2793. Karen Profet, Manhattan Beach 90266-2648  
 2794. Karen Quail, Davis 95616-2667  
 2795. Karen Rath, Oakland 94619-2717  
 2796. Karen Reid, Santa Rosa 95403-2410  
 2797. Karen Slater, Redding 96003-4050  
 2798. Karen Socher, Ventura 93001-3908  
 2799. Karen Spiegel, Burbank 91501-1438  
 2800. Karen Stewart, San Jose 95120-1781  
 2801. Karen Toscos, Atherton 94027-3824  
 2802. Karen Villanueva, San Francisco 94132-3055  
 2803. Karen Waterbury, Santa Clara 95051-1155  
 2804. Karen Wilson, Vallejo 94590-3197  
 2805. Karenn Ohlinder, Gardena 90249-3957  
 2806. Kari Walters, Pacific Palisades 90272-2155  
 2807. Karin Langer, Westlake Village 91362-4709  
 2808. Karin Machusic, Clayton 94517-1905  
 2809. Karin Rettig, Garden Grove 92845-3017  
 2810. Karissa Huang, Sunnyvale 94086-8230  
 2811. Karl B Ehlert, Redwood City 94061-3702  
 2812. Karl Eggers, Long Beach 90815-2303  
 2813. Karl Koessel, McKinleyville 95519-8168  
 2814. Karl Overby, Fullerton 92835-2211  
 2815. Karl Schumaker, Boulder Creek 95006-9718  
 2816. Karl Twombly, Palm Desert 92211-4553  
 2817. Karla Frandson, San Diego 92128-2608  
 2818. Karla Holmberg, Concord 94521-5005  
 2819. Karla Sterling, Spring Valley 91977-2435  
 2820. Karla Villalobos, Aliso Viejo 92656-1399  
 2821. Karlee Schnyder, El Cajon 92020-1058  
 2822. Karsten Mueller, Santa Cruz 95060-1766  
 2823. Karyn Lebrun, Escondido 92027-4246  
 2824. Karynn Merkel, Eureka 95503-5402  
 2825. Kashyap Puranik, Mountain View 94043-1351  
 2826. Katarina Grabowsky, Castro Valley 94546-2942  
 2827. Katarina Wittich, Los Angeles 90065-5020  
 2828. Kate Brotherton, Lake Forest 92630-6630  
 2829. Kate Considine, Camarillo 93012-9114  
 2830. Kate Disney, Los Altos 94022-1269  
 2831. Kate Lebares, Alameda 94501-3457  
 2832. kate rohrbach, Sausalito 94965-2048  
 2833. Kate Stemig, la 90045  
 2834. Kath Disney Nilson, Mendocino 95460-1842  
 2835. Katharine Kehr, Sebastopol 95472-3739  
 2836. Katherine Allen, Redway 95560  
 2837. Katherine Blake, Hayward 94541-5649  
 2838. Katherine Brady, Tustin 92782-3336  
 2839. Katherine Cima, San Francisco 94117-3917  
 2840. KATHERINE davis, San Clemente 92672-3315  
 2841. katherine haley, Lower Lake 95457-1309  
 2842. Katherine Harband, San Rafael 94913-4180  
 2843. Katherine Nolan, Cupertino 95014-2455  
 2844. Katherine Patterson, Ukiah 95482-4678  
 2845. Katherine R, Bake 93311  
 2846. Katherine Richardson, Pleasant Hill 94523-4521  
 2847. Katherine Roberts, Berkeley 94702-2029  
 2848. katherine ruiz, San Jose 95136-2058  
 2849. Katherine Villagran, Temecula 92592-8190  
 2850. Katherine Westine, Oakland 94618-1335  
 2851. Katherine Wright, Aliso Viejo 92656-1478  
 2852. Katheryn Rusk, Mission Viejo 92691-3929  
 2853. Kathey Ahrens, Roseville 95678-3105  
 2854. Kathi Sanger, Los Angeles 90068-2520  
 2855. Kathie Kingett, La Habra Heights 90631-8057  
 2856. kathie piccagli, San Francisco 94112-1743  
 2857. Kathleen Gardenias, Chico 95926-2578  
 2858. Kathleen Barrett, Newbury Park 91320-5116  
 2859. Kathleen Berry, Eureka 95501-1974  
 2860. Kathleen Clark, Glendale 91207-1811  
 2861. Kathleen Cooper, Lake Elsinore 92530-7525  
 2862. Kathleen DeLander, South San Francisco 94080  
 2863. Kathleen Engberg, Lakewood 90713-1618  
 2864. Kathleen Gadway, Berkeley 94703-2514  
 2865. Kathleen Grantham, Granada Hills 91344-3905  
 2866. Kathleen Head, Murrieta 92562-3525  
 2867. Kathleen Jacecko, Redondo Beach 90278-2827  
 2868. Kathleen Kalberer, Modesto 95350-5354  
 2869. Kathleen Kuczynski, Lake Forest 92630-3520  
 2870. Kathleen MacDonald, Mendocino 95460-0353  
 2871. Kathleen McNulty, Alameda 94501-7361  
 2872. kathleen montgomery, Hemet 92544-1980  
 2873. kathleen obre, Laguna Beach 92651-3036  
 2874. Kathleen Polletta, Fortuna 95540-2755  
 2875. Kathleen Powell, Vallejo 94590-3943  
 2876. Kathleen Rohlfing, Lincoln 95648-7711  
 2877. Kathleen Salvas, Grass Valley 95945-6412  
 2878. Kathleen Sanders, Susanville 96130-0776  
 2879. Kathleen Schinhofen, San Clemente 92674-1072  
 2880. Kathleen Shecter, Half Moon Bay 94019-1437  
 2881. Kathleen Sumida, San Diego 92120-1333  
 2882. Kathleen Trenam, Jackson 95642-2107  
 2883. kathleen van every, Atascadero 93422-4916

2884. Kathleen Wheeler, Chula Vista 91910-2409  
 2885. Kathryn Armstrong, Bodega 94922-0176  
 2886. Kathryn Black, Oakland 94611-5131  
 2887. Kathryn Choudhury, Moraga 94556-2310  
 2888. Kathryn Donahue, McKinleyville 95519  
 2889. Kathryn Hughes, Moreno Valley 92555-3114  
 2890. Kathryn Lanning, Visalia 93277-8802  
 2891. Kathryn Mahon, Pinon Hills 92372-1331  
 2892. Kathryn Rollins, Costa Mesa 92627-2347  
 2893. Kathryn Santana, Bradbury 91008-1218  
 2894. Kathy Brigger, Nuevo 92567-8920  
 2895. Kathy Cox, Moreno Valley 92556-0239  
 2896. Kathy Farmer, Shasta 96087-0722  
 2897. Kathy Frances, Arcata 95521-6541  
 2898. Kathy Hanson, Huntington Beach 92649-4027  
 2899. Kathy Hopkins, San Bernardino 92404-5303  
 2900. Kathy Jones, Benicia 94510-3728  
 2901. Kathy Karlin, Woodland Hills 91364-2726  
 2902. Kathy Kosinski, Goleta 93117-1500  
 2903. Kathy MacDougall, Ukiah 95482-4705  
 2904. Kathy Obrien, Redway 95560  
 2905. Kathy Popoff, San Pedro 90732-5015  
 2906. Kathy Robinson, Pleasant Hill 94523-3331  
 2907. Kathy Ruppel, Stanford 94305-8434  
 2908. Kathy Steinbrecher, Lafayette 94549-3026  
 2909. Kathy Zelaya, Los Angeles 90042-1281  
 2910. Katie Zukoski, Chico 95928-9197  
 2911. Katrina Brewer, Los Angeles 90049-5435  
 2912. Katy R, sebastopol 95472  
 2913. kay Gallin, Los Angeles 90064-2680  
 2914. Kay Ikranagara, Oakland 94618-1043  
 2915. Kay Mervin, Sacramento 95819-4204  
 2916. Kay Riley, Manhattan Beach 90266-3622  
 2917. Kay Schaser, Eureka 95501-3351  
 2918. Kaylah Sterling, Emeryville 94608-3577  
 2919. Keefe Nghe, Ventura 93004-2556  
 2920. Keisha Evans, East Palo Alto 94303-1753  
 2921. Keith Bein, Oakland 94602-4039  
 2922. Keith Bentz, St Helena 94574  
 2923. Keith Kinder, Pleasanton 94566-3212  
 2924. Keith Kotka, Santa Cruz 95065-9631  
 2925. keith Schubert, Long Beach 90804-1510  
 2926. Keith Sklower, El Cerrito 94530-2345  
 2927. Keith Widaman, Los Angeles 90041-3227  
 2928. Kelcey Poe, Oakland 94605-4126  
 2929. Kellee Richards, North Hollywood 91605-1250  
 2930. Kelli Lent, Alameda 94501-1603  
 2931. Kelli McGregor, Granada Hills 91344-4511  
 2932. Kelly Bowen, San Diego 92116-1930  
 2933. Kelly Finn, Grass Valley 95949-7802  
 2934. kelly hammargren, Berkeley 94703-1709  
 2935. Kelly Inglett, Montebello 90640-3491  
 2936. Kelly Miller, San Diego 92128-3835  
 2937. Kelly Morton, San Diego 92127-2005  
 2938. Kelly Walsh, Oakland 94609-2057  
 2939. Kelsey Quirarte, Yorba Linda 92887-6251  
 2940. Kelsey Wagner, Arroyo Grande 93420-3316  
 2941. Ken & Andrea Chraft, Simi Valley 93063  
 2942. Ken Bruer, Santa Barbara 93105  
 2943. Ken Ige, Brentwood 94513-5030  
 2944. Ken Mundy, Los Angeles 90068-1262  
 2945. Ken Sanford, Escondido 92029-4307  
 2946. Ken Yoskowitz, Paradise 95969-6606  
 2947. Kendall Hailey, Los Angeles 90006-5112  
 2948. Kendall Reid, San Clemente 92672-4332  
 2949. Kendra Brooks, Seal Beach 90740-6514  
 2950. Kendra Young, San Jose 95129-3944  
 2951. Kenneth A Meersand, Shell Beach 93448-3483  
 2952. Kenneth Aronson, California City 93505-4823  
 2953. Kenneth Bess, Walnut Creek 94595-1020  
 2954. Kenneth Fisher, Fortuna 95540-2409  
 2955. Kenneth Harper, Richmond 94805-2050  
 2956. Kenneth Kubarych, Del Mar 92014-4115  
 2957. Kenneth Lavine, Portola Valley 94028-7911  
 2958. Kenneth Nahigian, Sacramento 95827-3266  
 2959. kenneth naylor, Santa Maria 93455-4182  
 2960. Kenneth Poggenburg, Jr, Encinitas 92024-2423  
 2961. Kenneth Randolph, Manteca 95336  
 2962. Kenneth Weaver, Fallbrook 92028-3487  
 2963. Kenneth Wright, Santa Rosa 95403-1761  
 2964. Kent Grigg, Walnut Creek 94595-1320  
 2965. Kent Lennox, San Francisco 94134-2457  
 2966. Kent Williams, Glendora 91741-6603  
 2967. Kera Ung, Monterey Park 91755-3911  
 2968. Kermit Carraway, Auburn 95602-9505  
 2969. Kerreen Brandt, San Rafael 94903-3311  
 2970. Kerri Sevenbergen, Spring Valley 91977-4539  
 2971. Kerry Stanwyck, San Rafael 94903-3667  
 2972. Ketty Owens, Moorpark 93021-2777  
 2973. Keven Haddix, Fresno 93730-1227  
 2974. Kevin Abrahamian, Glendale 91202-2207  
 2975. Kevin Barnard, San Francisco 94115-4314  
 2976. Kevin Bissonnette, San Clemente 92672-2207  
 2977. Kevin Curtis, Fullerton 92832-1607  
 2978. Kevin Edelbrock, San Francisco 94117-2728  
 2979. Kevin Fistanic, Los Angeles 90066-6753  
 2980. Kevin Gamez, Bakersfield 93301-1516  
 2981. Kevin Kearney, Winchester 92596-8858  
 2982. Kevin Kraft, Menlo Park 94025-6050  
 2983. Kevin Lozaw, San Anselmo 94960-1417  
 2984. Kevin Mazzocco, Auberry 93602-9501  
 2985. Kevin McKelvie, Palm Springs 92264-9385  
 2986. Kevin Patterson, Walnut Creek 94595-2336  
 2987. Kevin Reynolds, Hayward 94541-3280  
 2988. Kevin Schader, Pleasant Hill 94523-1370  
 2989. Kevin Vasquez, Auburn 95602-8936  
 2990. Kevin Wall, Pleasant Hill 94523-3565  
 2991. Kevin Yerby, Sacramento 95838-1876  
 2992. Khalil Khan, San Diego 92116-1609  
 2993. Kim Baranek, Alameda 94501-1264

2994. Kim Barclay, Buena Park 90621-1044  
 2995. Kim Brack, Thermal 92274-8528  
 2996. Kim Fowler, Oakland 94619-3378  
 2997. Kim Hooper, Berkeley 94707-1911  
 2998. kim mcgoldrick, San Diego 92104-4921  
 2999. Kim Messmer, Santa Clara 95051-1154  
 3000. Kim Moore, Los angeles 90034  
 3001. Kim Nicholson, Valley Village 91607-2216  
 3002. Kim P, Santa Cruz 95062-3506  
 3003. Kim Peterson, Cloverdale 95425-3551  
 3004. Kim Tran, Santa Ana 92707-4315  
 3005. Kim Turner, Petaluma 94954-3905  
 3006. Kimberlie Laderriere, Paso Robles 93446-9449  
 3007. Kimberly Beliveau, Vallejo 94589-2528  
 3008. Kimberly Cerutti, El Dorado Hills 95762-5470  
 3009. Kimberly Emerson, Los Angeles 90034-4307  
 3010. Kimberly Hill, Carlsbad 92008-1127  
 3011. Kimberly Notary, Modesto 95350-5860  
 3012. Kimberly Scibetta, Shadow Hills 91040-1427  
 3013. Kimberly Simpson, San Fernando 91344-2336  
 3014. Kimberly Torres, Temecula 92592-6423  
 3015. Kimberly Vass, Fresno 93705-4430  
 3016. Kira Ballinger, Mission Viejo 92691-4240  
 3017. Kirk Margo, North Hollywood 91601-4532  
 3018. Kirk Nason, Huntington Beach 92648-4806  
 3019. Kirk Nelson, Oakland 94619-2938  
 3020. Klaudia Englund, Thousand Oaks 91360-1923  
 3021. Kody Diaz, San Clemente 92673-5647  
 3022. Kris Gregory, San Jose 95112-1750  
 3023. Kris Head, Garden Grove 92843-1078  
 3024. Krishna Venkatraman, San Francisco 94129-1078  
 3025. Krista Dana, Sunnyvale 94087-2241  
 3026. Kristeene Knopp, Oakland 94608-2814  
 3027. Kristen Conner, San Pablo 94806-4058  
 3028. Kristen Hickey, Escondido 92029-4040  
 3029. Kristen R, San Leandro 94579  
 3030. Kristi Wilson, Escondido 92025-3850  
 3031. Kristin Anundsen, San Francisco 94131-2009  
 3032. Kristin Shay, Newport Beach 92663-4227  
 3033. Kristina Hancock, San Diego 92101-8201  
 3034. Kristine Hodson, N Hollywood 91601-1775  
 3035. kristy christine, Placerville 95667-7702  
 3036. kuniko vroman, San Jose 95136-1322  
 3037. KURT Cruger, Long Beach 90803-5416  
 3038. Kurt Gary, Los Angeles 90066-1712  
 3039. Kurt Gross, San Diego 92176-6898  
 3040. Kurt Lorenz, Nevada City 95959-1564  
 3041. Kyle Yaskin, Los Angeles 90046-2133  
 3042. Kymberly Tompkins, Valencia 91354-1356  
 3043. L Denardo, Danville 94526-5650  
 3044. L Dinger, Rocklin 95677-4786  
 3045. L Douglas, Penngrove 94951-0502  
 3046. L Licari, Fullerton 92833-2439  
 3047. L Richards, Santa Rosa 95404-2231  
 3048. L Y Chan, San Francisco 94131-3355  
 3049. Lacey Hicks, Union City 94587-4578  
 3050. Lael Jackson, Del Mar 92014-0424  
 3051. laila del monte, Van Nuys 91406-6317  
 3052. Lama Lane, Costa Mesa 92627-7140  
 3053. Lana Brewer-Fioresi, Sonoma 95476-7717  
 3054. Lana Kennings, Mill Valley 94941-4116  
 3055. Lana Touchstone, Vallejo 94591-5738  
 3056. Lance Robert, San Diego 92101-8639  
 3057. Lance Sprague, Gualala 95445-8327  
 3058. Lanelle Lovelace, Columbia 95310-0283  
 3059. Lanie Keystone, Vacaville 95688-2136  
 3060. Larissa Berry, Hacienda Heights 91745-2934  
 3061. Larry & Evelyn Harvill, Redlands 92374-6455  
 3062. Larry Branson, Pomona 91767-4739  
 3063. Larry Brenner, San Francisco 94114-1434  
 3064. Larry Burbach, San Francisco 94114-3367  
 3065. Larry Downing, Port Hueneme 93041-3404  
 3066. Larry Holme, Oakland 94611-1200  
 3067. Larry Jasper, West Hollywood 90046-5810  
 3068. Larry Lima, Campbell 95008-2903  
 3069. Larry Melton, Davis 95616-2710  
 3070. Larry Miller, Beverly Hills 90212-4222  
 3071. Larry Rosenberg, Tahoe City 96145-6902  
 3072. Larry Steen, Los Angeles 90035-4412  
 3073. Larry Wittmeyer, Guerneville 95446-9662  
 3074. LARRY&LORETTA Bodiford, Soulsbyville 95372-0579  
 3075. Laszlo Kurucz, Lake Forest 92630-6731  
 3076. Laura Berguer, Novato 94945-2612  
 3077. Laura Black, Beverly Hills 90212-1671  
 3078. Laura Buss, San Francisco 94110-5814  
 3079. Laura Cook, Santa Cruz 95062-5028  
 3080. Laura Craun, Bakersfield 93311-1817  
 3081. Laura D, Albany 94706-1525  
 3082. Laura DeHaven, Santa Barbara 93105-6420  
 3083. Laura Dorais, Benicia 94510-3114  
 3084. Laura Freeman, Sacramento 95821-3839  
 3085. Laura Havstad, Sebastopol 95472-9571  
 3086. Laura Jones, Cerritos 90703-6946  
 3087. Laura Koeninger, Ukiah 95482-3705  
 3088. Laura LaRocca, Toluca Lake 91602-2560  
 3089. Laura Larsen, San Francisco 94122-3608  
 3090. Laura Larson, Los Angeles 90021-1244  
 3091. Laura Lichterman, Mill Valley 94941-3858  
 3092. Laura Lois, Rohnert Park 94928-4109  
 3093. Laura McKinney, Saratoga 95070-5028  
 3094. Laura Milbury, Modesto 95355-9679  
 3095. Laura Morales, San Ysidro 92173-2444  
 3096. Laura Newton, Cathedral City 92234-7845  
 3097. Laura Overmann, Burlingame 94010-5141  
 3098. Laura Payne, Alhambra 91803-4302  
 3099. Laura Quay, Irvine 92612-2724  
 3100. Laura Rasay Siasoco, San Jose 95134-2615  
 3101. Laura Thomas, Oxnard 93035-1717  
 3102. Laura Woods, Los Angeles 90036-3769

3103. Laureen McCoy, La Crescenta 91214-2856  
 3104. Laurel Brewer, West Hollywood 90069-4063  
 3105. Laurel Crockett, Clayton 94517-1933  
 3106. Laurel DeCou, Oakland 94609-1839  
 3107. Laurel Langill, Los Altos 94024-4741  
 3108. Laurel McKeever, City 96057  
 3109. Laurel Przybylski, Oakland 94605-2903  
 3110. Laurel Tucker, Claremont 91711-3741  
 3111. Lauren Appling, Penn Valley 95946-9458  
 3112. Lauren Baldwin, Vista 92081-7359  
 3113. Lauren Bryant, La Crescenta 91214-1323  
 3114. Lauren Govain-Eastman, Oakland 94606-2582  
 3115. Lauren Hansen, San Diego 92122-5273  
 3116. lauren kline, Redondo Beach 90277-0267  
 3117. Lauren Leonarduzzi, Gilroy 95020-3018  
 3118. Lauren Linda, Laguna Woods 92637-8151  
 3119. Lauren Murdock, Santa Barbara 93110-1650  
 3120. Lauren Perrish, Norwalk 90660  
 3121. Lauren Ranz, Lafayette 94549-6243  
 3122. Lauren Schiffman, El Cerrito 94530-1331  
 3123. Lauren Shapiro, Canoga Park 91304-6111  
 3124. Lauren Stoneburner, Rancho Palos Verdes 90275  
 3125. Laurene Brown, Encinitas 92024-4231  
 3126. Laurie Alper, Santa Monica 90403-1668  
 3127. Laurie Barlow, San Marino 91108-2842  
 3128. Laurie Budash, Napa 94559-2436  
 3129. Laurie DeWitt, Oceano 93445-9433  
 3130. Laurie Eisler, Cotati 94931-4565  
 3131. Laurie Epstein-Terris, Sacramento 95822-1122  
 3132. Laurie Hallihan, Alpine 91901-2269  
 3133. Laurie Long, San Rafael 94901-1938  
 3134. Laurie Mitcheltree, Yorba Linda 92886-3603  
 3135. Laurie Price, Redwood City 94063-2705  
 3136. Laurie Tsitsivas, Dana Point 92629-2046  
 3137. Lawrence Dillard, Jr, San Francisco 94107-1330  
 3138. Lawrence Dillard, Jr. , San Francisco 94107-1330  
 3139. Lawrence Elbe, Redding 96001-2984  
 3140. Lawrence Fait, Riverside 92504-6074  
 3141. Lawrence Joe, Pasadena 91107-5557  
 3142. Lawrence Laslett, Watsonville 95076-9632  
 3143. Lawrence Mallach, Thousand Oaks 91360-6541  
 3144. Lawrence Padilla, Roseville 95678-2141  
 3145. Lawrence Thompson, Livermore 94550-8134  
 3146. LawrenceMark Olson, Glendora 91740-5400  
 3147. Leah Anton, Ross 94957-0342  
 3148. Leah Berman, Aptos 95003-3305  
 3149. Leah Mercado, Covina 91722-3545  
 3150. Leah Olson, San Francisco 94104-4215  
 3151. Leah Olson, San Francisco 94117-2439  
 3152. LeAnn Miller, Napa 94559-3717  
 3153. Leanna Noble, Long Beach 90802-2373  
 3154. Leanna Pierson, Sacramento 95822-4229  
 3155. Leanne Friedman, Davis 95616-0853  
 3156. Leanne Landers, Vista 92084-3846  
 3157. Leasa Thernes, San Diego 92104-5007  
 3158. Lee Ann Kolker, Cupertino 95014-3628  
 3159. Lee Backus, Simi Valley 93063-2003  
 3160. Lee Berthel, Oakland 94619-2406  
 3161. Lee Dragu, Calabasas 91302  
 3162. lee Jordan, Los Angeles 90056-1906  
 3163. Lee margot, San Diego 92104-5442  
 3164. Lee Perry, Corralitos 95076-0514  
 3165. Lee Robinson, El Dorado Hills 95762-9747  
 3166. Lee Tennant, Dana Point 92629-1910  
 3167. lee wilson, San Diego 92126-1802  
 3168. Leigh Ann DiCarlo, Winchester 92596-8506  
 3169. Leigh Clark, Granada Hills 91344-6858  
 3170. Leigh DiCarlo, Winchester 92596-8506  
 3171. Leigh Levin, Los Angeles 90024-2263  
 3172. Leigh Stroud, Encinitas 92024-2103  
 3173. Leilani DiCato, Orange 92868-3925  
 3174. Leland Wilson, La Verne 91750-4333  
 3175. Lena Fine, Campbell 95008-3536  
 3176. Leni Gerber, Los Angeles 90035-2619  
 3177. Lenore Cymes, Palo Alto 94303-3119  
 3178. Lenore Dowling, Los Angeles 90039-3049  
 3179. Lenore Sorensen, Kensington 94707-1319  
 3180. Leon Van Steen, San Francisco 94134-1910  
 3181. Leona Mccann, Concord 94519-1718  
 3182. Leonard Anderson, Santa Cruz 95062-1821  
 3183. leonardo nunez, Lompoc 93436-1707  
 3184. Leroy Short, Huntington Beach 92649-2217  
 3185. Les Roberts, Fresno 93704-4335  
 3186. Lesle Helgason, Pebble Beach 93953-3043  
 3187. Lesley Pamela Culhane, Camarillo 93010-1108  
 3188. Lesley Paul, Harbor City 90710-2648  
 3189. Leslie Aisenman, Sylmar 91342-1705  
 3190. Leslie Andrews, Santa Cruz 95060-5003  
 3191. Leslie Bennett, Moorpark 93021-3186  
 3192. Leslie Bogart, Santa Monica 90405-2720  
 3193. Leslie Browne, Santa Monica 90403-1035  
 3194. Leslie Carothers, Altadena 91001-4308  
 3195. Leslie Crockett, San Rafael 94901-3830  
 3196. leslie davis, Fair Oaks 95628-3913  
 3197. Leslie Gould, San Anselmo 94960  
 3198. Leslie Hixson, Santa Ana 92707-4921  
 3199. Leslie Nieves, Hayward 94544-4461  
 3200. Leslie Rapp, San Diego 92129-5712  
 3201. Leslie Robinson, Sacramento 95816-5626  
 3202. Leslie Shapiro, Arroyo Grande 93420-5548  
 3203. Leslie Siltan, Los Angeles 90027-5920  
 3204. Leslie Taylor, Ojai 93023-1802  
 3205. leslie wilmingtion, San Rafael 94901-2662  
 3206. Letitia Berlin, Albany 94706-1037  
 3207. Lew Douglas, Oakland 94618-1624  
 3208. Lewis Kaweck, Kings Beach 96143-0096  
 3209. Lexie Cole, Santa Monica 90404-5117  
 3210. Li Lan Chan, Westminster 92683-6345  
 3211. lia supanich, Petaluma 94952-3669  
 3212. Lianna Giovannoni, Windsor 95492-9491

3213. Licia Perea, Los Angeles 90027-4753  
3214. Lidice Pollan, Woodland Hills 91364-5345  
3215. Li-hsia Wang, Berkeley 94705-1947  
3216. Lilithe Magdalene, Middletown 95461-1478  
3217. Lillie Falco-Adkins, Mountain View 94043-3330  
3218. Lily Lau-Enright, Sacramento 95819-1759  
3219. Lily Marie, Rough and Ready 95975-0242  
3220. Linda Akins, Altaville 95221-1027  
3221. Linda Antone, Santa Barbara 93105-3174  
3222. Linda Barner, Fresno 93726-3322  
3223. Linda Baxter, Yreka 96097-9602  
3224. Linda Bloombecker, Santa Cruz 95062-4163  
3225. Linda Boone, Palm Desert 92260-5754  
3226. Linda Bottarini, Santa Cruz 95060-1803  
3227. Linda Bouman, Fullerton 92835-1949  
3228. Linda Boyle, Redding 96002-0746  
3229. Linda Bruce, Yuba City 95993-5608  
3230. Linda Brush, Truckee 96162-7986  
3231. Linda Claire, Irvine 92606-1204  
3232. LINDA D JONES, Bakersfield 93387-0876  
3233. Linda David, San Diego 92105-4511  
3234. Linda Dragavon, San Francisco 94114-3925  
3235. Linda Eckert, Arcata 95518-4934  
3236. Linda Emme, Marshall 94940  
3237. Linda Ferratta, Santa Barbara 93105-9759  
3238. Linda Fong, Sacramento 95831-2823  
3239. LINDA FOSTER-BROOKS, La Palma 90623  
3240. Linda Frankel, San Leandro 94578-1925  
3241. Linda Gee, San Leandro 94578-3503  
3242. Linda Goldman, Mission Viejo 92691-1917  
3243. Linda Hall, Castaic 91384-3211  
3244. linda hunt, Berkeley 94702-1913  
3245. Linda Kierce, Cambria 93428-3605  
3246. Linda klein, El Segundo 90245-3259  
3247. Linda Krieg, Redwood City 94061-2774  
3248. Linda Kroosz, Half Moon Bay 94019-1771  
3249. Linda L Hill, Goleta 93117-4090  
3250. linda lagace, Riverbank 95367-9638  
3251. Linda Little, Woodland Hills 91364-4417  
3252. Linda Lux, Vallejo 94591-7763  
3253. Linda MacNeal, Oak View 93022-9528  
3254. Linda Malcom, Vallejo 94591-8003  
3255. Linda Marble, San Francisco 94132-3034  
3256. Linda Martin, Auburn 95603-6050  
3257. Linda McElroy, Sacramento 95827-1102  
3258. Linda Mellen, Newport Beach 92661-1434  
3259. Linda Morgan, San Pablo 94806-3767  
3260. Linda Nicholes, Anaheim 92807-4070  
3261. Linda Noble, Sunol 94586-9425  
3262. Linda Oeth, Corona Del Mar 92625-2611  
3263. Linda Ostro, Oakland 94611-2621  
3264. Linda Paravagna, Walnut Creek 94598-3204  
3265. Linda Prandi, Sacramento 95834-7519  
3266. Linda Reilly, Cypress 90630-4119  
3267. Linda Richards, Gilroy 95020-9476  
3268. Linda Rzeznik, Los Angeles 90027-2667  
3269. Linda Schmid, Mountain View 94043-1126  
3270. Linda Shadle, Anaheim 92804-5268  
3271. Linda Spanski, Oceanside 92054-6536  
3272. Linda Sturges, Glendale 91202-1679  
3273. Linda Taffet, Dana Point 92629-2202  
3274. Linda Torn, Los Angeles 90031-1416  
3275. Linda Toy, San Rafael 94901-1406  
3276. Linda Waldron, San Diego 92103-1876  
3277. Linda Ward, Montebello 90640-2147  
3278. Linda Whetstine, Poway 92064-3714  
3279. Linda Wood, Fresno 93704-6146  
3280. Linda Zagula, Berkeley 94702-1803  
3281. Lindsay DeBoer, Mission Viejo 92692-2709  
3282. Lindsay Duran, Mission Viejo 92690-1208  
3283. Lindsay Mugglestone, Berkeley 94705-1948  
3284. Lindsey Shere, Healdsburg 95448-9304  
3285. Linnea Fronce, Sacramento 95822-1712  
3286. Lisa Ann Kelly, Santa Barbara 93101-1021  
3287. Lisa Annecone, Santa Rosa 95407-5499  
3288. Lisa Atwood, El Cajon 92020-7360  
3289. Lisa Barron, Los Angeles 90064-2308  
3290. Lisa Bernstein, Piedmont 94620-0663  
3291. Lisa Brackmann, San Diego 92117-6122  
3292. Lisa Dahill, Thousand Oaks 91360-3218  
3293. lisa getline, Carmel 93923-8376  
3294. Lisa Gherardi, Los Gatos 95032-5422  
3295. Lisa Hammermeister, Granada Hills 91344-2857  
3296. Lisa Holtzman, Santa Monica 90405-4929  
3297. Lisa Jensen, Emerald Hills 94062-3917  
3298. Lisa Krekorian, San Mateo 94402-1328  
3299. Lisa Marguerite Mora, Los Angeles 90066-1154  
3300. Lisa Nelson, Benicia 94510-2227  
3301. LISA PATTON, San Francisco 94115-3234  
3302. Lisa Piner, Costa Mesa 92626-2066  
3303. Lisa Rhudy, El Portal 95318-0295  
3304. Lisa Soon, Santa Cruz 95060-5210  
3305. Lisa Turco, Sherman Oaks 91411-3018  
3306. Lisa Voorhees, Mission Viejo 92691-2215  
3307. Lisa Wenzel, Albany 94706-2316  
3308. Lisa Williams, Huntington Beach 92646-3127  
3309. Lisabeth Collins, Los Angeles 90026-2531  
3310. Lisbeth Caccese, Santa Barbara 93110-4406  
3311. Lise Kastigar, Laguna Niguel 92677-2720  
3312. Lissa Wentner, San Rafael 94901-4204  
3313. Liz Davenport, Upland 91784-1914  
3314. Liz Frankfather, Los Angeles 90019-3155  
3315. Liza Markle, Santa Monica 90403-3276  
3316. Lizabeth Flyer, Burbank 91505-3410  
3317. Lloyd Niven, Studio City 91604-1016  
3318. lloyd reynolds, Fountain Valley 92708-1145  
3319. Lois B, Freedom 95019-0007  
3320. Lois Ehrenfeld De Buren, San Francisco 94114  
3321. Lois Shubert, Camarillo 93010-3036  
3322. lollie ragana, Santa Monica 90405-5538

3323. Lonna Richmond, Muir Beach 94965-9757  
 3324. Lonnie Sheinart, Los Angeles 90064-3521  
 3325. Lora Jerugim, Los Angeles 90048-4710  
 3326. lorelai dubler, Santa Barbara 93102-1231  
 3327. Lorena Serrano, San Francisco 94109-4415  
 3328. Loretta Long, Napa 94558-5579  
 3329. Loretta Thomason, Palmdale 93551-4064  
 3330. Lori Christensen, San Diego 92120-3235  
 3331. Lori Conrad, Davis 95618-1613  
 3332. Lori Dick, Claremont 91711-1431  
 3333. Lori Goodman, Beverly Hills 90210-1015  
 3334. Lori Kegler, San Pedro 90731-6213  
 3335. Lori Smith, Cathedral City 92234-6726  
 3336. Lori Vest, Potter Valley 95469-9736  
 3337. Lori White, Kelseyville 95451-9516  
 3338. Lorna Hudgins, Pasadena 91104-4002  
 3339. Lorne Cheeseman, Irvine 92620-1953  
 3340. Lorraine Lawrence, San Diego 92130-2218  
 3341. Lorraine Lowry, Etobicoke 90211  
 3342. Lorraine Seiji, El Cerrito 94530-3217  
 3343. Lorraine Unger, Bakersfield 93312-6731  
 3344. Lorretta Marcel, San Francisco 94134-1220  
 3345. Lorrie Klosterman, Berkeley 94709-1032  
 3346. Lotti Knowles, Valley Glen 91401-4700  
 3347. Louis Adamo, Redwood City 94063-0041  
 3348. Louis Spirito, Malibu 90265-4461  
 3349. Louise Garrett, Citrus Heights 95621-4913  
 3350. Louise Hawley, Palm Springs 92264-7932  
 3351. Louise Johnson, Modesto 95350-5035  
 3352. Louise Mcernan Loane, San Francisco 94116  
 3353. Louise Rangel, Santa Paula 93060-1425  
 3354. Louise Zimmer, Paso Robles 93446-4253  
 3355. lowell abellon, Los Angeles 90032-1926  
 3356. lu carpenter, San Francisco 94131-1022  
 3357. Luan Aubin, Sacramento 95828-6101  
 3358. Luce Gauthier, Los Angeles 90016-1512  
 3359. Lucia Dill, Oakland 94602-2513  
 3360. Luciana Johnson, Sacramento 95819-4125  
 3361. Lucienne O'Keefe, Greenbrae 94904-2441  
 3362. Lucile J Taber, San Francisco 94127-1705  
 3363. Lucille Hayes, Campbell 95008-3746  
 3364. Lucinda Henderson, Lafayette 94549-2140  
 3365. Lucy Nichols, Ventura 93004-3150  
 3366. Luis Lozano, Long Beach 90803-7230  
 3367. Luis Marquez, Chula Vista 91910-5325  
 3368. Luise Perenne, Fountain Valley 92708-6722  
 3369. Luke Johnson, Inglewood 90301-3519  
 3370. Lupe Avila, Sebastopol 95473-0507  
 3371. Luranne Drager, San Francisco 94122-2728  
 3372. Lyle Eklof, S San Fran 94080-4164  
 3373. Lyn Goldinger, Culver City 90230-4933  
 3374. Lyn McClure, Placerville 95667-9144  
 3375. Lyn Younger, San Jose 95111-3810  
 3376. Lynda Aubrey, Elk 95432-0126  
 3377. Lynda Wu, Mammoth Lakes 93546  
 3378. Lynette Aguzzi, San Ramon 94582-4608  
 3379. Lynette Ridder, Concord 94521-2910  
 3380. Lynn Armstrong, El Cerrito 94530-3349  
 3381. Lynn Baker, Martinez 94553-1566  
 3382. Lynn Bennett, Calistoga 94515-9594  
 3383. Lynn Boulton, Lee Vining 93541-0234  
 3384. Lynn Camhi, Petaluma 94952-6446  
 3385. Lynn Fonkalsrud, Camarillo 93010-9237  
 3386. lynn harrigan, Marina 93933-2206  
 3387. Lynn Hurley, Santa Barbara 93105-2569  
 3388. Lynn Piquett, Santa Cruz 95060-3709  
 3389. Lynn Race, 92583  
 3390. Lynn Stafford, Pine Mountain Club 93222-6825  
 3391. Lynn Thorensen, Santa Cruz 95060-6455  
 3392. Lynne Colvig, Thousand Palms 92276-3759  
 3393. Lynne Eggers, San Francisco 94110-5331  
 3394. Lynne Frame, Mill Valley 94941-2723  
 3395. Lynne Pertum, Pasadena 91106-3764  
 3396. Lynne Pratt, San Diego 92109-6602  
 3397. Lynne Preston, San Francisco 94107-2688  
 3398. Lynne Weiske, Los Angeles 90048-5106  
 3399. Lynnette Royce, Bishop 93514-3437  
 3400. M Susan Ditzler, Carmel 93923-8204  
 3401. M Blissit, Palm Springs 92264-8683  
 3402. M Canter, Belvedere Tiburon 94920-2036  
 3403. m d, Manhattan Beach 90266  
 3404. M J Greene, Studio City 91604-3024  
 3405. M K Russell, Mill Valley 94941-2240  
 3406. m may, Carlsbad 92008-1949  
 3407. M McCormick, Newport Beach 92663-2102  
 3408. M Pinochet, Sausalito 94966-2009  
 3409. m robinson, n hollywood 91606  
 3410. M Ross, San Rafael 94901-1834  
 3411. M Sanders, Petaluma 94952-4123  
 3412. M Silver, Sacramento 95831-4007  
 3413. M Topping, Los Angeles 90004-1450  
 3414. M Virginia Leslie, Milpitas 95035-3532  
 3415. Macrina Rodriguez, Sacramento 95835-2059  
 3416. Maddy Hengge, Encinitas 92024-2654  
 3417. Madeleine Butcher, Woodland Hills 91365-6548  
 3418. Madeleine Fisher Kern, Los Angeles 90036-3013  
 3419. Madeleine H Peterson, Santa Maria 93454-2677  
 3420. Madeline Coleman, Monte Sereno 95030-2251  
 3421. Madison Irvin, Torrance 90505-7217  
 3422. Maeve Murphy, San Rafael 94901-4372  
 3423. Magaly Fernandez, San Francisco 94124-2345  
 3424. Magda Martine, Fallbrook 92028-4006  
 3425. Magdalena Aguilar, Santa Ana 92703-3558  
 3426. Maggie Flower, Del Mar 92014-3612  
 3427. Maggie Hughes, Berkeley 94704-2247  
 3428. Majda Jones, Portola Valley 94028-8038  
 3429. Malcolm Groome, Topanga 90290-3353  
 3430. Mani White, Oakland 94602-1448  
 3431. Manmeet Toor, Los Angeles 90024-3000  
 3432. Manuel Banuelos, Rosemead 91770-3010

3433. Manuel Castaneda, West Covina 91790-3948  
3434. Mara Johnson, Santa Clarita 91390-5716  
3435. Marc Futernick, Pasadena 91106-4316  
3436. Marc Gordon, Sunnyvale 94087-4054  
3437. MARC HERTZ, Van Nuys 91401-1445  
3438. Marc Joseph, San Mateo 94402-3840  
3439. Marc Lieberman, San Francisco 94102  
3440. Marc Silverman, Los Angeles 90068-3071  
3441. Marci Levine, Los Angeles 90046-1840  
3442. Marci Nunez, Castro Valley 94546-4135  
3443. marci smith, Tehachapi 93561-7953  
3444. Marcia Edelen, Berkeley 94704-2711  
3445. Marcia Jones, El Dorado Hills 95762-5402  
3446. Marcia Joswick, Pinole 94564-1153  
3447. Marcia McEachern, San Rafael 94901-1208  
3448. Marcia Petroccky, Long Beach 90807-1707  
3449. Marcia Shakman-Stern, Canyon Country 91351  
3450. Marcia Tyriver, Santa Rosa 95409-5913  
3451. Marcia Wilson, Oakland 94605-4610  
3452. Marcie Ligammari, Paradise 95969-4264  
3453. MARE DON, Playa Del Rey 90296-5324  
3454. Maree McGuirea, Castro Valley 94552-9501  
3455. Maree Penhart, Oxnard 93035-3743  
3456. Marek Ertl, Zvolen 96001  
3457. Margaret Anderson, Petaluma 94952-4030  
3458. Margaret Branch, Arcata 95521-6519  
3459. Margaret Brooker, Marina Del Rey 90292-7398  
3460. Margaret DeMott, Sacramento 95822-8309  
3461. Margaret Fish, Boonville 95415-0533  
3462. Margaret Keenan, San Jose 95129-3126  
3463. Margaret Madsen, Soquel 95073-3021  
3464. Margaret Masek, Danville 94526-3739  
3465. Margaret Morales, Santa Cruz 95062-2952  
3466. Margaret Ong, Davis 95617-0128  
3467. Margaret Phelps, Los Angeles 90024-6183  
3468. Margaret Rogers, Redwood City 94062-1315  
3469. Margaret Spak, Menlo Park 94025-2739  
3470. Margaret T Petkiewicz, San Jose 95125-2952  
3471. Margaret Wessels, Aptos 95003-5927  
3472. Margaret Wilkes, San Jose 95128-2143  
3473. Margarette Woodard, Lake Arrowhead 92352  
3474. MARGARITA SANIN, Los Angeles 90065-3717  
3475. Margarita Zamora, Alamo 94507-1251  
3476. Margarite Reynolds, San Francisco 94107-2384  
3477. Marge Schwartz, Santa Barbara 93121-1955  
3478. Margie Borchers, Santa Barbara 93101-1138  
3479. Margo Berdanis, Long Beach 90807-4810  
3480. Margot White, Toluca Lake 91602-1566  
3481. Margret Head, San Jose 95117-1653  
3482. Marguerite Sgrillo, Richmond 94806-5899  
3483. Marguerite Shuster, Sierra Madre 91024-1232  
3484. Mari Dominguez, Linden 95236-9419  
3485. Mari Matsumoto, Alameda 94501-1509  
3486. Maria Bernardo, Burbank 91505-4554  
3487. Maria D'Amato, Los Angeles 90026-1009  
3488. Maria Dambrosio, Bermuda Dunes 92203-9514  
3489. Maria Elena Hernandez, Los Angeles 90048-4427  
3490. Maria J Cruz, Fresno 93722-2807  
3491. Maria Jolliff, Vista 92081-8784  
3492. maria koci, Oakland 94609-1914  
3493. Maria Manjarrez, Sunnyvale 94086-6651  
3494. Maria Montalvan, Chula Vista 91910-7850  
3495. Maria Nesheim, Aptos 95003-3347  
3496. Maria Schneider, San Diego 92128-3653  
3497. Maria Socorro, Los Angeles 90066-3710  
3498. Maria Sosa, San Luis Obispo 93405-6865  
3499. Mariam Shah-Rais, Los Angeles 90035-4324  
3500. Marian Brischle, San Francisco 94114  
3501. Marian Carter, West Covina 91791-1937  
3502. Marian Gorrell, Thousand Oaks 91362-2761  
3503. Marian Hardin, Daly City 94015-4555  
3504. Marian Isaac, Modesto 95354-0238  
3505. Marian Kadota, Carpinteria 93013-1459  
3506. marian valeri, San Diego 92123-3436  
3507. Mariana Delafuente, Newcastle 95658-9720  
3508. Marianna Mejia Contact, Soquel 95073-9708  
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3510. Marianna Riser, Novato 94949-6305  
3511. Marianne Bentel, La Quinta 92253-3736  
3512. Marianne Bithell, Arcata 95521-9212  
3513. Marianne Brettell-Vaughn, Bishop 93514-7079  
3514. marianne ewing, Bolinas 94924-9735  
3515. Marie Andreini, Livermore 94550-7384  
3516. Marie Anthony, Palo Alto 94303-3965  
3517. Marie Beckham, Aptos 95003-2842  
3518. Marie Burkart, Hayward 94544-4978  
3519. Marie O'Rourke, San Mateo 94402-3601  
3520. Marie Perry, Ceres 95307-4102  
3521. Marie Sherwood, Los Angeles 90068-2982  
3522. Marie Turner, Playa Vista 90094-2313  
3523. Marika Leff, Novato 94948-1851  
3524. Marilu Romero, Fontana 92336-3023  
3525. Marilyn Anderson, Mill Valley 94941-5056  
3526. Marilyn Barthelow, Auburn 95602-9314  
3527. marilyn berlin, San Francisco 94122-4219  
3528. marilyn Brown, Grover Beach 93433-1646  
3529. Marilyn Carlson, Los Gatos 95030-6312  
3530. Marilyn Gudmundsson, Hermosa Beach 90254  
3531. Marilyn Jasper, Loomis 95650-9749  
3532. Marilyn Judson, Santa Monica 90403-2218  
3533. Marilyn Levine, Mountain View 94041-1640  
3534. Marilyn McAteer, Antioch 94531-7638  
3535. Marilyn Price, Mill Valley 94941-2074  
3536. Marilyn Rodgers, San Jose 95136-2910  
3537. Marilyn Shepherd, Trinidad 95570-0715  
3538. Marilyn Standley, Sebastopol 95473-2327  
3539. Marilyn Tovar, Stockton 95210-6740  
3540. Marilyn Tripp, Salinas 93901-4612  
3541. Marilyn Veltrop, Soquel 95073-9710  
3542. Marilyn Wills, Los Osos 93402-2304

3543. Marina Sastre, Torrance 90503  
 3544. Marinna Wagner, Los Angeles 90086-2283  
 3545. Marion O'Leary, San Jose 95123-5303  
 3546. Marion Toms, Santa Barbara 93108-1644  
 3547. Marion Van, San Bernardino 92404-6135  
 3548. Maris Sidenstecker, Watsonville 95076-4442  
 3549. marisa baca, Fremont 94536-4464  
 3550. Marisa Kieren, San Jose 95118-1617  
 3551. Marisa Nelson, Sausalito 94965-2064  
 3552. Marisa Roszak, Valencia 91355-2253  
 3553. Marisol Murad, Los Angeles 90046-1414  
 3554. Marjorie Moss, Del Mar 92014-3823  
 3555. Marjorie Nothern, Danville 94506-2124  
 3556. Marjorie Salmeron, Eureka 95501-3706  
 3557. Marjorie Sanchez, Monterey Park 91755-4131  
 3558. Marjorie Trolinder, Fairfield 94534-4017  
 3559. marjorie xavier, Hayward 94542-2152  
 3560. Mark Anderson, Comptche 95427-0456  
 3561. Mark Betti, Sherman Oaks 91423-4530  
 3562. Mark Ferlito, Discovery Bay 94505-9227  
 3563. Mark Fiore, San Francisco 94122-2120  
 3564. Mark Gallegos, Los Angeles 90033-3111  
 3565. Mark Golembiewski, Pacifica 94044-3845  
 3566. Mark Grossman, Palo Alto 94301-4004  
 3567. Mark Hacker, Baldwin Park 91706-5613  
 3568. Mark Hanisee, Riverside 92506-4708  
 3569. Mark Hargraves, Sebastopol 95472-9602  
 3570. Mark Hurst, Orinda 94563-3922  
 3571. Mark Lindsey, Long Beach 90803-5324  
 3572. Mark Luiso, San Jose 95118-3543  
 3573. Mark Merner, Santa Rosa 95404-4029  
 3574. Mark Moise, Oxnard 93033-4530  
 3575. Mark Moramarco, Gualala 95445-1532  
 3576. Mark Poland, Palmdale 93550-7703  
 3577. Mark Reback, Los Angeles 90042-1107  
 3578. Mark Spevak, Anaheim 92808-1047  
 3579. Mark Standon, San Bernardino 92407-2840  
 3580. Mark Sussek, Van Nuys 91404-2475  
 3581. Mark Tokarczyk, Del Mar 92014-0572  
 3582. Mark Walkowiak, Burbank 91506-1321  
 3583. Mark Weinberg, Oakland 94602-1529  
 3584. Mark Wilson, San Jose 95129-4054  
 3585. Marko Pavlovic, Sacramento 95831-3566  
 3586. Marla Crites, Chico 95928-9103  
 3587. Marla Feierabend, Santa Barbara 93109-1835  
 3588. Marla Hess, Fullerton 92831-3318  
 3589. MARlene Saifer, Venice 90291-4565  
 3590. Marlies Lee, San Jose 95120-3133  
 3591. Marlyne Hadley, Clayton 94517-1433  
 3592. Marrick Sayers, Studio City 91604-5505  
 3593. Marsha Bezan, Sebastopol 95472-4290  
 3594. Marsha Harris, Pauma Valley 92061-9552  
 3595. Marsha Klotzle, Altadena 91001-2328  
 3596. Marsha Lucero, Nipomo 93444-2007  
 3597. Marsha Lyon, San Diego 92116-4008  
 3598. Marsha Slosburg, Sylmar 91342-3327  
 3599. Marston James, Los Angeles 90046-4314  
 3600. Marta Peters, Clovis 93612-3532  
 3601. Martha and Richard Galaif, Pacific Palisades  
 90272-2603  
 3602. Martha Dragovich, Martinez 94553-2320  
 3603. Martha Engber, Santa Clara 95051-4611  
 3604. Martha Fellows, Ojai 93023-1701  
 3605. Martha Hollenbeck, Greenbrae 94904-1124  
 3606. Martha Kean, City 94526  
 3607. Martha Low, Salinas 93907-8531  
 3608. Martha McNamee, Walnut Creek 94595-1367  
 3609. Martha Muller, Long Beach 90805-3616  
 3610. Martha Schwartz, Santa Cruz 95060-4856  
 3611. Martha Widmann, Three Rivers 93271-9708  
 3612. Martha Williams, Pacifica 94044-4438  
 3613. Martin Horwitz, San Francisco 94122-1608  
 3614. Martin Marcus, San Diego 92120-1112  
 3615. Martin Saitta, San Diego 92108-1070  
 3616. Martin Slack, Redondo Beach 90277-2545  
 3617. Martin Spitz, Napa 94558-6724  
 3618. Martin Tripp, Santa Clarita 91390-3100  
 3619. Martitia Palmer, Winnetka 91306-2997  
 3620. Marty Miner, Moss Beach 94038-0021  
 3621. Maruka Fernandez, Oakland 94606-4801  
 3622. MARVIN COHEN, Walnut Creek 94595-2433  
 3623. Marvin Sawyer, Yucca Valley 92284-8653  
 3624. Mary Able, Mearthur 96056-7633  
 3625. Mary Ann Taylor, Vallejo 94591-6629  
 3626. Mary Ann Wilkinson, Pacific Grove 93950-3528  
 3627. Mary Anne Fuchs, San Diego 92130-4839  
 3628. mary appel, Sacramento 95811-4194  
 3629. Mary Argo, Sacramento 95818-3027  
 3630. mary baville, San Dimas 91773-3669  
 3631. mary betlach, Glendale 91206-1110  
 3632. Mary Bryden, South Lake Tahoe 96151-4368  
 3633. Mary Budrunas, Orange 92869-2863  
 3634. mary Burns, Paradise 95969-2512  
 3635. Mary Charters, Los Gatos 95030-5821  
 3636. Mary Chase, Novato 94947-3714  
 3637. Mary Claire Frantz, Burbank 91504-3680  
 3638. Mary Currie, San Anselmo 94960-1412  
 3639. Mary DeLap, Sebastopol 95472-3055  
 3640. Mary Doane, Freedom 95019-2215  
 3641. Mary Eister, Arroyo Grande 93420-4222  
 3642. Mary Elizabeth Perry, Pasadena 91105-1339  
 3643. Mary Ellen Weldele, Hacienda Heights 91745  
 3644. Mary Elliott-Klemm, Somerset 95684-0310  
 3645. Mary F Platter-Rieger, San Diego 92105-5130  
 3646. Mary Fedullo, San Jose 95123-5001  
 3647. Mary Grindeland, Sunnyvale 94089-5001  
 3648. Mary Haberle, Los Angeles 90027-6008  
 3649. Mary Haley, Elk Grove 95758-7134  
 3650. mary Hamilton, Hemet 92544-4937  
 3651. Mary Hicklin, Lakeside 92040



3652. Mary Hicklin, San Diego 92117  
 3653. Mary Jane Adams, Paso Robles 93446-2035  
 3654. Mary Jane Ryan, Walnut Creek 94595-1337  
 3655. Mary Lorain, Oakland 94602-1766  
 3656. Mary Lou Copp, Mountain View 94043-1435  
 3657. Mary Mallory, Orinda 94563-4214  
 3658. Mary Malloy, MD, Hillsborough 94010-7143  
 3659. Mary Malone, Los Angeles 90071-2632  
 3660. Mary Martin, Modesto 95350-0713  
 3661. Mary Miles-Finigan, San Jose 95127-2543  
 3662. Mary Nybakken, San Francisco 94127-1826  
 3663. Mary Osborn, El Dorado 95623-5028  
 3664. Mary Page, Aptos 95003-3979  
 3665. Mary Parks, Lompoc 93436-1364  
 3666. Mary Patz, Simi Valley 93063-2390  
 3667. Mary R Mcdermith, Mountain View 94040-4556  
 3668. Mary Rakow, San Francisco 94111-2327  
 3669. Mary Romanek, Santa Monica 90404-1215  
 3670. Mary Rose, Berkeley 94702-1438  
 3671. Mary Ross, Rancho Palos Verdes 90275-5735  
 3672. Mary Rossi, Santee 92071-1161  
 3673. Mary Scheid, Grass Valley 95945-7004  
 3674. Mary Shallenberger, Paradise 95969-4271  
 3675. Mary Smith, Santee 92071-8458  
 3676. mary speare, San Diego 92109-1349  
 3677. mary stark, Pasadena 91107-2061  
 3678. Mary Sullivan, Huntington Beach 92647-3360  
 3679. Mary Tilton, Capistrano Beach 92624-1233  
 3680. Mary Walter, Berkeley 94704-1828  
 3681. Maryann LaNew, San Clemente 92673-6520  
 3682. Marybeth Rice, Berkeley 94708-1820  
 3683. Maryellen Jackson, Monte Rio 95462-0132  
 3684. Maryellen Redish, Palm Springs 92264-0648  
 3685. MaryKay Rodarte, Phelan 92371-6430  
 3686. Marylouise Johnson, Santa Monica 90406-2024  
 3687. Marylucia Arace, Fullerton 92835-4020  
 3688. MaryLynn Kramer, Fullerton 92835-1811  
 3689. Mary-Lynne Bainbridge, Los Gatos 95032-4729  
 3690. Masayo Honjo, Newbury Park 91320-3748  
 3691. Mashuri Warren, Lafayette 94549-1807  
 3692. Mason Kocel, Oceanside 92057-1835  
 3693. Mathew Vipond, Sacramento 95818-3554  
 3694. Matilde Navarro, Garden Grove 92841-1528  
 3695. Matt Barmore, San Diego 92109-3752  
 3696. Matthew Askari, Los Angeles 90004-1207  
 3697. Matthew Dunaway, Bishop 93514-2954  
 3698. Matthew Emmer, Sherman Oaks 91423-4048  
 3699. Matthew John, Marina Del Rey 90292-7397  
 3700. Matthew Johnson, Anaheim 92801-1327  
 3701. Matthew Patchell, San Francisco 94131-2738  
 3702. Matthew Reid, Calistoga 94515-1737  
 3703. Matthew Reola, San Clemente 92672-6624  
 3704. Matthew Roth, La Mesa 91942-3831  
 3705. Matthew Ruggiero, Oakland 94601-3807  
 3706. Maura Metz, Davis 95617-4195  
 3707. Maureen Besancon, Nevada City 95959-9602  
 3708. maureen maloney, San Jose 95117-2203  
 3709. Maureen mcdonald, Los Angeles 90068-2334  
 3710. Maureen Mehler, Laguna Woods 92637-8729  
 3711. MAUREEN PLIMIER, Oakland 94611-5305  
 3712. Maurica Anderson, Bridgeport 93517  
 3713. Maurice Robinson, Manhattan Beach 90266-7229  
 3714. Mauro Ferrero, Los Angeles 90045-1055  
 3715. Mavis Lazell, Santa Rosa 95404-3025  
 3716. maxine dorazio, Lafayette 94549-2922  
 3717. Maxine Jacobsen, Stockton 95209-4894  
 3718. Maxine Litwak, Novato 94949-5347  
 3719. Maya Markovich, Palo Alto 94306-1236  
 3720. Maylou Bartlett, Berkeley 94710-2620  
 3721. Mckenzie Rasmussen, Goleta 93117-2467  
 3722. mecky,jay,al,li myers, tower, morale, Redondo Beach 90277-3243  
 3723. Meera P, Fremont 94539-4914  
 3724. Megan Clock, Nevada City 95959-2200  
 3725. Megan McCullough, Oak View 93022-9329  
 3726. Megan Shumway, Sacramento 95821-2514  
 3727. Meghan ODell, Long Beach 90803-5869  
 3728. Melanie B Goldman, Valley Center 92082-5006  
 3729. Melanie Cresci, El Cerrito 94530-1725  
 3730. Melanie Cross, Palo Alto 94306-2608  
 3731. melanie fisher, Calabasas 91302-3073  
 3732. Melanie Goldberg, Albany 94706-2132  
 3733. Melanie Haupt, Modesto 95355-2278  
 3734. Melanie Irwin, Ventura 93003-6472  
 3735. Melanie Jones, San Pedro 90731-6979  
 3736. Meleina Mayhew, Los Angeles 90039-3643  
 3737. Melia Schiwiwtz, San Francisco 94117  
 3738. Melinda Cotton, Long Beach 90803-0310  
 3739. Melinda Dean Young, Atascadero 93422-3477  
 3740. Melinda Forstey, San Diego 92109-6318  
 3741. Melinda Goulart, Morgan Hill 95037-4726  
 3742. Melinda Lusk Zuerlein, Carlsbad 92008-2510  
 3743. Melissa Aguirre, Anaheim 92806-3629  
 3744. Melissa Atkinson, Los Angeles 90064-3208  
 3745. Melissa Bischoff, Berkeley 94707  
 3746. Melissa Borbon, Los Banos 93635-2905  
 3747. melissa felipe, Fallbrook 92028-2401  
 3748. Melissa Hammons, Fresno 93727-6162  
 3749. Melissa Hutchinson, Pacific Grove 93950-3146  
 3750. Melissa Locher, Redlands 92373-6716  
 3751. Melissa Marquez, Placerville 95667-9301  
 3752. Melissa McCarthy, San Francisco 94117-3816  
 3753. Melissa Murphy, El Cerrito 94530-1843  
 3754. Melissa Ochoa, Los Angeles 90061-3012  
 3755. Melissa Schwartz, Pasadena 91103-3040  
 3756. Melodie White, Walnut Creek 94595-1428  
 3757. Melody Grigg, Santa Maria 93455-3129  
 3758. melody hamilton, trinidad 95570  
 3759. Melony Davis, Inglewood 90302-3946  
 3760. melvin taylor, Sacramento 95823-5780

3761. Melvin Zimmerman, Morro Bay 93442-2141  
 3762. Melvyn Nefsky, Marina Del Rey 90292-9240  
 3763. mendy bates, Foresthill 95631-0826  
 3764. Mendy Thijssen, Mountain View 94043-4656  
 3765. Mercy Sidbury, Sebastopol 95472-2017  
 3766. Meredith Hazan, Los Angeles 90068-3822  
 3767. Meredith Priestley, Solana Beach 92075-2416  
 3768. Merilie Robertson, Canoga Park 91307-1240  
 3769. Merlin Wilson, Salinas 93907-2038  
 3770. Merry Campbell, Pollock Pines 95726-9582  
 3771. Meryl Lowell, South Lake Tahoe 96150-7421  
 3772. Meryl Martino, Mammoth Lakes 93546-3326  
 3773. Mh Ciesinski, San Jose 95120-4037  
 3774. Mha Atma S Khalsa, Los Angeles 90035-3314  
 3775. Mia Trachinger, Los Angeles 90027-4615  
 3776. Micah Frankel, San Clemente 92673-6819  
 3777. Michael Ames, Castro Valley 94546-1125  
 3778. Michael Archer, Santa Cruz 95061-7346  
 3779. Michael Belli, South San Francisco 94080-4230  
 3780. Michael Berg, San Jose 95138-1717  
 3781. michael bordenave, Fresno 93728-2941  
 3782. Michael Boshears, Crestline 92325-3684  
 3783. Michael C Ford and Richard B. Marks,  
     Watsonville 95076-2018  
 3784. Michael Cavanaugh, Redondo Beach 90278-3861  
 3785. Michael D Nesel, Palmdale 93550-3202  
 3786. Michael Daetwyler, Fresno 93730-4757  
 3787. Michael Diaz, Walnut Creek 94597-2400  
 3788. Michael Drella, Santa Ana 92701-8211  
 3789. Michael Epling, Pacifica 94044-3635  
 3790. Michael Fishbein, Los Angeles 90025-1829  
 3791. Michael Freeman, Bakersfield 93309-1189  
 3792. Michael Fruth, Oakhurst 93644-9304  
 3793. Michael Garitty, Nevada City 95959-8515  
 3794. michael gertz, San Francisco 94117-1562  
 3795. Michael Glow, Los Gatos 95032-3627  
 3796. Michael Gold, San Francisco 94110-5730  
 3797. Michael Harris, San Rafael 94903-1605  
 3798. Michael Henderson, Huntington Beach 92649  
 3799. Michael Hogan, Del Mar 92014-4230  
 3800. Michael House, Redwood City 94061-3543  
 3801. Michael Hunter, Woodacre 94973-0696  
 3802. Michael Johns, Corona 92883-5223  
 3803. Michael Kast, Panorama City 91402-1476  
 3804. Michael Keene, Nevada City 95959-2914  
 3805. Michael Kemper, San Francisco 94109-4915  
 3806. Michael Kenney, El Cerrito 94530-1610  
 3807. Michael Kloby, Lake Forest 92630-6514  
 3808. Michael Leonard, La Jolla 92038-0654  
 3809. Michael Levin, San Francisco 94131-1934  
 3810. Michael Lynch, Oakland 94605-2230  
 3811. michael mazzarella, Pacific Palisades 90272-2203  
 3812. Michael McGinley, San Francisco 94133-1511  
 3813. Michael McLaughlin, Downey 90241-4978  
 3814. michael mclaughlin, Sacramento 95826-1815  
 3815. Michael Mills, Sierra Madre 91025-0037  
 3816. Michael Mitsuda, Fremont 94555-1285  
 3817. Michael Neal, Loomis 95650-8401  
 3818. Michael Olander, Rancho Cucamonga 91701  
 3819. michael pfeffer, San Francisco 94107-2528  
 3820. Michael Piotrowski, Ramona 92065-6106  
 3821. Michael Rodriguez, Rosemead 91770-4110  
 3822. Michael Rotcher, Mission Viejo 92692-2351  
 3823. Michael Russell, Santa Paula 93060-1302  
 3824. Michael Santopietro, Eureka 95503  
 3825. Michael Sarabia, Stockton 95207-5147  
 3826. Michael Sawaya, Los Angeles 90024-3083  
 3827. Michael Smith, La Jolla 92037-7714  
 3828. Michael Soto, Alhambra 91801-1769  
 3829. Michael Threadgill, Winchester 92596-0722  
 3830. Michael Tomczyszyn, San Francisco 94132-3140  
 3831. Michael Tschirhart, Escondido 92027-2778  
 3832. Michael Zelniker, Los Angeles 90068-2416  
 3833. Michaele Belles, Huntington Beach 92647-6403  
 3834. Michaela Pascual, Santa Clarita 91387-5164  
 3835. Michaline LePaule, Berkeley 94703-1323  
 3836. Michel Horvat, Los Angeles 90036-2514  
 3837. Michele Coakley, Rancho Cordova 95670-2517  
 3838. Michele Dawn Sanderson, Walnut Creek 94595-  
 3839. Michele Halligan, Ukiah 95482-4206  
 3840. Michele Pedrini, Arcadia 91007-6778  
 3841. Michele Sanderson, Walnut Creek 94595-3793  
 3842. Michele Santoro, Davis 95616-5597  
 3843. Michele Sterling, San Francisco 94117-1709  
 3844. Michele Taylor, Perris 92571-3784  
 3845. Michelle Baik, Brea 92821-5400  
 3846. Michelle Bitting, Pacific Palisades 90272-2309  
 3847. Michelle Carter, San Francisco 94104-4602  
 3848. Michelle Cheung, San Diego 92130-6011  
 3849. Michelle Embree, Sacramento 95822-2569  
 3850. Michelle Esparza, Reseda 91335-1638  
 3851. Michelle Goodman, Hawthorne 90250-4949  
 3852. Michelle Haddy, Orange 92869-3194  
 3853. Michelle Lind, Hawthorne 90250-4949  
 3854. Michelle Montgomery, Napa 94558-6606  
 3855. Michelle Moudry, Redlands 92373-5935  
 3856. Michelle Nelson, Gilroy 95020-8217  
 3857. Michelle Orengo-McFarlane, El Sobrante 94803  
 3858. Michelle Palladine, Palm Springs 92262-6620  
 3859. Michelle Robinson, Los Angeles 90020-2509  
 3860. Michelle Vanasten, Dublin 94568-1115  
 3861. Mika Stonehawk, Tustin 92782-8008  
 3862. Mikail Barron, Felton 95018-9624  
 3863. Mike Bonar, San Mateo 94402-1555  
 3864. Mike Cass, Novato 94947-4766  
 3865. Mike Chatlosh, Menifee 92584-7669  
 3866. Mike Daveiga, Concord 94518-1309  
 3867. Mike Jones, West Hills 91307-2409  
 3868. Mike Moore, Playa Del Rey 90293-7774  
 3869. Mike Rolbeck, Placerville 95667-7702

3870. Mike Therrien, San Pedro 90731-6859  
 3871. Mike Trivich, Sylmar 91342-5723  
 3872. Mikella Adair, Visalia 93277-6673  
 3873. Mildred Bean, Newport Beach 92663-2657  
 3874. Miles Abbott, Santa Monica 90405-3163  
 3875. Miles Monroe, Huntington Beach 92649  
 3876. Milton Carrigan, San Luis Obispo 93401-5501  
 3877. Mimi Kimball, Cayucos 93430-1429  
 3878. Mindy Destro, Dublin 94568-7490  
 3879. Mir Bahmanyar, Van Nuys 91406-5407  
 3880. Miranda Everett, Lake Isabella 93240-0616  
 3881. Miranda Leiva, Sherman Oaks 91423-2279  
 3882. miranda mendoza, Santa Rosa 95401-6124  
 3883. Mirella Arroyo, Santa Barbara 93103-2534  
 3884. Miriam Baum, Alta Loma 91701-3111  
 3885. Miriam Cantor, Los Angeles 90019-3726  
 3886. MIRIAM L IOSUPOVICI, Imperial Beach  
 91932-3165  
 3887. Miriam Levitt, Berkeley 94703-1221  
 3888. Misha Askren, Los Angeles 90019-6615  
 3889. Mitch Dalition, San Francisco 94117-2279  
 3890. Mitchel Saadi, San Jose 95128-1117  
 3891. Mitchell Ahlenius, Oakland 94607-4619  
 3892. Mitchell Bonner, San Francisco 94108-3504  
 3893. Miyuki Powell, Midway City 92655-1609  
 3894. MJ Murphy, Carlsbad 92009-2040  
 3895. M'Lou Christ, Santa Ana 92705-2826  
 3896. Moira J Johnston, Napa 94559-4744  
 3897. Molly Huddleston, Santa Rosa 95402-1119  
 3898. Molly McConnell, San Diego 92116-2237  
 3899. Monica Gallegos, Riverside 92503-3554  
 3900. Monica Rudman, Sacramento 95816-3344  
 3901. Monica Wiesener, Calabasas 91302-1076  
 3902. Monika Calef, Huntington Beach 92647-4240  
 3903. Morena Loomis, Goleta 93117-1302  
 3904. Morgan Campbell, Daly City 94015-4908  
 3905. Morgan Corviday, Eureka 95501-2242  
 3906. Morgan Kousser, Altadena 91001-3430  
 3907. morgan lewis, Simi Valley 93063-3336  
 3908. Mrs Joyce Raye, Salinas 93908-9336  
 3909. Ms Lilith, Ventura 93003-4929  
 3910. Musser IV, San Jose 95125-4610  
 3911. Mya Russell, Grass Valley 95945-8711  
 3912. Mya Shone, Vallejo 94591-4110  
 3913. Myrna Faulds, Millbrae 94030-2113  
 3914. Myrna Velasco, Canyon Country 91351-2721  
 3915. n gooch, Ridgecrest 93555-3609  
 3916. N Kaluza, El Sobrante 94803-3857  
 3917. N Rezek, Altadena 91001  
 3918. Nadia Haddad, Monterey Park 91754-3619  
 3919. Nadia Haddad, Monterey Park 91754-3622  
 3920. Nadine Larsen, Dana Point 92629  
 3921. Nadya Disend, Oakland 94608-2612  
 3922. Nadya Tichman, Oakland 94602-1929  
 3923. Nagaditya Devarakonda, Rancho Palos Verdes

90275  
 3924. Nagisa VanVliet, Livermore 94551-8938  
 3925. Naida Sperling, Palo Alto 94303-3731  
 3926. Namita Dalal, Los Altos 94022-4268  
 3927. Nan Matthews, Pacifica 94044-2407  
 3928. Nan Singh-Bowman, Ben Lomond 95005-9213  
 3929. Nance Wilson, Oakland 94611-1237  
 3930. Nancey Carter, Topaz 96133-9115  
 3931. Nanci Clifton, Oakland 94611-1833  
 3932. Nancy Abel, Santa Monica 90405-1541  
 3933. Nancy Adinolfi, Sacramento 95827-1025  
 3934. Nancy Barcellona, Los Angeles 90004-5312  
 3935. Nancy Beaney, Los Angeles 90066-5473  
 3936. Nancy Berman, Kensington 94707-1412  
 3937. nancy bohnnet, Sausalito 94965-1449  
 3938. Nancy Borelli, Santa Rosa Valley 93012-9387  
 3939. Nancy Bukowski, Carmichael 95608-5655  
 3940. Nancy Corona, Riverside 92504-2362  
 3941. Nancy Cronin, Sacramento 95833-2388  
 3942. Nancy Fomenko, San Jose 95135-2102  
 3943. Nancy Forbes, Rancho Palos Verdes 90275-4463  
 3944. Nancy Freemer, Lake Elsinore 92530-5612  
 3945. Nancy Gilbert, Grass Valley 95945-7956  
 3946. Nancy Grant, El Cerrito 94530-1652  
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 3954. Nancy Kubik, Novato 94949-5347  
 3955. Nancy Lilienthal, Los Angeles 90035-3107  
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 3957. Nancy Oliver Flores, Esq, Valencia 91354-1838  
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 3960. nancy politico, Orangevale 95662-5418  
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4306. Ralph Sinick, San Francisco 94118-4219  
4307. Ramona coronado, Pasadena 91106-2019

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4353. rene Lambert, Berkeley 94703-2105  
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4360. Renee Robles, Garden Grove 92843-2741  
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4364. Rex Rysewyk, Temecula 92592-7108  
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4367. rhoda howard, West Hills 91304-5228  
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4392. Richard Ferry, San Jose 95112-1911  
4393. Richard Haynes, Sebastopol 95472-5715  
4394. Richard Heimanson, Sherman Oaks 91423-3476  
4395. Richard Huss, Richmond 94804-5617  
4396. Richard Jones, San Diego 92130-2463  
4397. Richard L Cowart, San Luis Obispo 93405-1768  
4398. Richard Lyman, Redwood City 94061-3663  
4399. Richard Massery, Walnut Creek 94597-2955  
4400. Richard Mercer, San Rafael 94901-4022  
4401. Richard O'Connor, Walnut Creek 94598-4915  
4402. Richard Perez, Los Angeles 90045-3816  
4403. Richard Saunders, Oakland 94609-1124  
4404. Richard Schwager, Santa Barbara 93105-2140  
4405. Richard Siquig, Carmel Valley 93924-9404  
4406. Richard Stearns, Soquel 95073-3014  
4407. Richard Takagi, Fullerton 92831-2929  
4408. Richard Thoele, Berkeley 94703-2033  
4409. Richard Tietz, Lafayette 94549-5110  
4410. Richard Valencia, South Pasadena 91030-3146  
4411. Richard Whaley, Eureka 95503-8913  
4412. Richard Wightman, Arcadia 91006-2501  
4413. Richard Zoah-Henderson, Eureka 95503-6249  
4414. Rick Boston, Santa Cruz 95062-4845  
4415. Rick Edmondson, Danville 94526-3934  
4416. Rick Kanter, Riverside 92501  
4417. Rick Koury, Los Gatos 95032-1136

4418. Rick Posten, Los Angeles 90049-3046  
4419. Rick Shreve, Weott 95571-0011  
4420. Rick Sparks, Toluca Lake 91602-1002  
4421. Rick Wilson, Oceanside 92054-2267  
4422. Riley Racer, Sherman Oaks 91411-3826  
4423. Rita Carlson, Eureka 95502-3753  
4424. Rita Fisher, Los Gatos 95030-7509  
4425. Rita Mccue, Oakland 94606-1322  
4426. Rita McKissick, San Jose 95132-2202  
4427. Rita Ohriner, Carlsbad 92009-1722  
4428. Rita Santos-Oyama, Long Beach 90803  
4429. RJ cooper, Lake Forest 92630-6201  
4430. RJ Padiernos, Tustin 92780-6800  
4431. rob christiansen, Laguna Beach 92651-3103  
4432. Rob Firmin, Kensington 94708-1118  
4433. Rob Gallinger, Los Angeles 90042-3228  
4434. Rob Mulligan, Fountain Valley 92708-7251  
4435. Rob Myers, ANAHEIM 92804  
4436. Rob Yenney, Ventura 93004  
4437. Robert Applebaum, San Jose 95135-1424  
4438. Robert Berend, Fresno 93726-4439  
4439. Robert Burk, Los Angeles 90024-2544  
4440. Robert Callahan, Santa Cruz 95060-9784  
4441. Robert Chacon, Beaumont 92223-3392  
4442. Robert Chirpin, Northridge 91324-2906  
4443. robert claesson, El Cajon 92020-1765  
4444. Robert Clyde, Joshua Tree 92252-3126  
4445. ROBERT COX, Fort Bragg 95437-2341  
4446. Robert Cushman, Lotus 95651-9717  
4447. Robert Danelski, Venice 90291-4973  
4448. Robert Deering, Watsonville 95076-1353  
4449. Robert DeGraff, San Luis Obispo 93401-5735  
4450. Robert Dorenstreich, San Francisco 94109-5954  
4451. Robert Drey, Monterey Park 91754-4708  
4452. Robert Elder, Los Angeles 90027-1308  
4453. Robert Fromer, Palmdale 93550-4214  
4454. Robert Glover, Fresno 93726-2313  
4455. Robert Godes, Berkeley 94705-2517  
4456. Robert Gondell, Woodacre 94973-0172  
4457. Robert Gore, Los Gatos 95032-2516  
4458. Robert Gustafson, National City 91950-2053  
4459. Robert Hall, Oakland 94618-2123  
4460. Robert Harrison, Forestville 95436-9694  
4461. Robert Hofer, Carson 90746-1159  
4462. Robert Hyodo, Sunnyvale 94087-1581  
4463. Robert Johnson, El Segundo 90245-3259  
4464. Robert Johnson, Placerville 95667-4660  
4465. Robert Jump, Ukiah 95482-6642  
4466. Robert Keller, San Diego 92119-1403  
4467. Robert Kornet, Simi Valley 93065-3901  
4468. Robert Kurz, Laguna Niguel 92677-2343  
4469. Robert Kvaas, Goleta 93117-1623  
4470. Robert L Oman, Sylmar 91342-1339  
4471. Robert Lindey, Rancho Cordova 95670-5624  
4472. Robert Lonnquist, San Diego 92128-2956  
4473. Robert Mayer, San Francisco 94131-2640  
4474. Robert McCombs, Bayside 95524-9333  
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4483. robert petersen, Salinas 93908-1205  
4484. Robert Petitpas, Guerneville 95446-9529  
4485. Robert Phillips, Simi Valley 93063-3236  
4486. robert raven, Novato 94945-1686  
4487. Robert Reed, Laguna Beach 92651-1870  
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4489. Robert Sargent, Torrance 90502-3023  
4490. Robert Seltzer, Malibu 90265-5630  
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4493. Robert SooHoo, Sacramento 95818-3949  
4494. Robert Sullivan, MD, Sacramento 95816-3426  
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4496. Robert Taine, San Francisco 94131-2554  
4497. Robert Taylor, Clearlake 95422-9173  
4498. Robert Tran, Milpitas 95035-8649  
4499. Robert Wallace, Whittier 90602-2547  
4500. Robert Wedemeyer, Palo Alto 94301-2906  
4501. Robert Whitehead, Sacramento 95822-5143  
4502. Roberta Bristol, Capitola 95010-2303  
4503. Roberta Heist, Fort Bragg 95437-7743  
4504. Roberta LaFrance, San Leandro 94579-1958  
4505. Roberta Landers, Redwood City 94061-3686  
4506. Roberta Morrow-Jones, Fort Bragg 95437-9207  
4507. Roberta Orlando, San Francisco 94108-3194  
4508. Roberta Reed, Huntington Beach 92648-4411  
4509. Roberta Schear, Oakland 94618-1730  
4510. Roberta Smith, Hemet 92543-8114  
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4512. Roberta Thompson-Hopkins, Anaheim 92802  
4513. Robin Graham, San Francisco 94121-1004  
4514. Robin Karp, San Diego 92106-1977  
4515. Robin Lande, Los Angeles 90036-2542  
4516. Robin Lane, San Diego 92126-1152  
4517. Robin Masciocchi, Saratoga 95070-6296  
4518. Robin Mulligan, Fountain Valley 92708-7251  
4519. Robin Polse, Capitola 95010-1728  
4520. Robin Pratt, Berkeley 94702-1761  
4521. Robin Reinhart, San Diego 92104-4907  
4522. Robin Russell, Beverly Hills 90210-1612  
4523. Robin Schoenfeld, Tarzana 91356-5114  
4524. Robin Steudle, Laguna Woods 92637-2765  
4525. Robin West, Atherton 94027-4058  
4526. Robyn Miles, San Francisco 94110-5403  
4527. Robyn Raymer, Albany 94706-2121



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4529. Rocio Miranda, Oakland 94619-1833  
4530. Rodney Hill, Grass Valley 95949-8333  
4531. rody stains, alturas 96101  
4532. Roger Adams, Ventura 93001-3519  
4533. Roger Cook, Bakersfield 93312-6244  
4534. Roger Gloss, Rancho Santa Margarita 92688  
4535. Roger Harrell, Hermosa Beach 90254-2617  
4536. Roger Hull, Torrance 90504-1733  
4537. Roger Lebow, Sierra Madre 91024-2053  
4538. Roger Reading, Huntington Beach 92649-4921  
4539. Roger Robles, Petaluma 94954-5627  
4540. Roger Runnoe, Oakland 94611-2039  
4541. Roger Sadler, Highland 92346-5843  
4542. Roger Seapy, Los Alamitos 90720-4153  
4543. Roger Steel, Chico 95928-8201  
4544. Roger Taylor, Sausalito 94965-1819  
4545. Roger Vortman, Santa Cruz 95060-6329  
4546. Rogers Turrentine, Oceanside 92054-3271  
4547. Roland Leong, Pleasant Hill 94523-4235  
4548. Roland Press, Redondo Beach 90278-2019  
4549. Roman Anton, San Francisco 94158  
4550. Ron Cachopo, Santa Clara 95051-3842  
4551. Ron DeStefano, Mill Valley 94941-3434  
4552. Ron Frasz, Hermosa Beach 90254-3454  
4553. Ron Goldman, Los Altos 94024-6902  
4554. Ron Jacob, San Jose 95117-2501  
4555. Ron Kresch, Martinez 94553-6217  
4556. Ron Melin, Trinidad 95570-9673  
4557. Ron Metheny, Cardiff By The Sea 92007  
4558. Ron Price, Ontario 91762-4311  
4559. Ron Vogel, San Jose 95131-2402  
4560. Ronald & June Bonn, San Diego 92124-3424  
4561. Ronald Blond, Rch Palos Vrd 90275-6606  
4562. Ronald Bogin, El Cerrito 94530-1424  
4563. Ronald Cheng, San Jose 95112-3668  
4564. Ronald Gothberg, Long Beach 90815-3026  
4565. Ronald Lukasiewicz, Carlsbad 92011-3425  
4566. Ronald Partridge, Simi Valley 93063-6409  
4567. Ronald Rediger, Newhall 91321-2406  
4568. Ronald Trost, Winchester 92596-8259  
4569. Ronen Hartfeld, San Francisco 94117-3334  
4570. Roni Depue, Fremont 94538-1030  
4571. Rory Alden, Berkeley 94704-3130  
4572. rosa Lucas, Palm Desert 92260-2665  
4573. Rosalie Salvato, Burbank 91506-3318  
4574. Rosalind Bresnahan, San Bernardino 92405-2318  
4575. Rosalind Milliken, Indio 92203-9778  
4576. Rosalyn Christianson, Davis 95616-2915  
4577. Rosalyn Rivkin, Berkeley 94708-1232  
4578. Rose An, Arcadia 91007  
4579. Rose Chapman, San Rafael 94903  
4580. Rose Geddes, Studio City 91604-1526  
4581. Rose Henderson, Los Angeles 90044-2419  
4582. Rose Marie Jacobs, Davenport 95017-9708  
4583. Rose Messina, Ventura 93001-2427  
4584. rose shuck, San Francisco 94114-3146  
4585. Rose Vierling, San Anselmo 94960-2815  
4586. Rosemary Kimber, Berkeley 94705-2042  
4587. Rosemary Meert, Foster City 94404-3562  
4588. Rosemary Silva, San Diego 92105-3508  
4589. Rosie Keller, Kenwood 95452  
4590. Roslyn Jones, Riverside 92506-5365  
4591. Roslyn Raney, Menlo Park 94025-1843  
4592. Ross Stromberg, Healdsburg 95448-9790  
4593. ROVEDA Kaarina, Beverly Hills 90210  
4594. Rowena Carlson, San Diego 92106-1842  
4595. Rowena Finegan, Sausalito 94965-2146  
4596. Roxanna Sullivan, La Mesa 91941-6340  
4597. Roxanne Navarro, Thousand Oaks 91362-3022  
4598. Roxanne Navarro, Thousand Oaks 91362-3067  
4599. Roy Campanella II, Beverly Hills 90211-2811  
4600. Roy Childs, Stockton 95219-6515  
4601. roy rosenblatt, Sherman Oaks 91403-5053  
4602. Roz Gayler, Rancho Mirage 92270-2532  
4603. Roz Goldstein, Greenbrae 94904-1106  
4604. Rozanne Miller, San Diego 92110-5180  
4605. Ruben Cuevas, Altadena 91001-2414  
4606. Ruben Willis, Stanton 90680-1813  
4607. Ruben, Carol Saenz, Riverside 92504-5650  
4608. Rubina Khilnani, Redwood City 94063-5516  
4609. Ruby Tyus, La Mesa 91942-8199  
4610. Rudy Stefenel, Milpitas 95035-2533  
4611. Rudy Zeller, Berkeley 94702-1127  
4612. Rueenfang Wang, El Dorado Hls 95762-5428  
4613. Russell Sperry, Ventura 93003-0218  
4614. Russell Symonds, Costa Mesa 92627-2268  
4615. Russell Tunder, Woodacre 94973-0882  
4616. Ruth Blackman, Los Angeles 90094-3000  
4617. Ruth Eileen Leatherman, San Rafael 94903-1130  
4618. Ruth Finkelstein, Santa Barbara 93111-1510  
4619. Ruth Levy, Santa Rosa 95409-5890  
4620. ruth sinfuego, Palm Springs 92263-4872  
4621. Ruth Smiler, Alameda 94501-3223  
4622. Ruth Stoner Muzzin, Montara 94037-0761  
4623. Ruth Valdez, Aptos 95001-2142  
4624. Ruthanne Hartman, La Quinta 92247-0867  
4625. Ryan Acebo, Oakland 94602-3444  
4626. Ryan Davis, Burbank 91502  
4627. Ryan Koons, Los Angeles 90034-6904  
4628. Ryan McKenzie, Apple Valley 92308-5724  
4629. Ryan Moore, Santa Barbara 93105-3448  
4630. Ryan Plume, Panorama City 91402-4059  
4631. Ryan W , Fontana 92336-0148  
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4633. S Feiven-Alleston, Los Gatos 95032-1210  
4634. S Jones, Huntington Beach 92605-3862  
4635. S Nico, Los Angeles 90019-3826  
4636. S Thompson, Los Angeles 90026-1425  
4637. S Zonia, Beverly Hills 90210

4638. Sabrina Elizondo, Santa Monica 90404-7108  
 4639. Sabrina Kemeny, Los Angeles 90027-1365  
 4640. Sabrina Sarne, Danville 94526-5132  
 4641. Sabrina Wolby, Long Beach 90814-1156  
 4642. Sally Allen, Citrus Heights 95621-7330  
 4643. Sally Arnold, Santa Cruz 95060  
 4644. Sally Arscott, LOS ANGELES 90065  
 4645. Sally Arscott, Los Angeles 90065-3413  
 4646. Sally Driscoll, Laguna Woods 92637-0305  
 4647. Sally Haberlin, Laguna Niguel 92677-7402  
 4648. Sally Harman, San Francisco 94102-3256  
 4649. Sally Madigan, Meadow Vista 95722-9575  
 4650. Sally Nelson, Temecula 92591-2033  
 4651. Sally Smith, Sacramento 95841-3013  
 4652. Sally Stone, Calimesa 92320-1706  
 4653. Sam Madison-Jammal, San Diego 92104-4936  
 4654. Sam Monkars, Los Angeles 90021-2300  
 4655. Sam Stephens, Orange 92869-4377  
 4656. Samantha Beumahr, Lakeside 92040-5000  
 4657. Samantha Honowitz, Los Angeles 90045-1825  
 4658. Samantha Knight, Vacaville 95687-6137  
 4659. Sammuel Licea, Lemon Grove 91945-2739  
 4660. Samuel Durkin, Fairfield 94534-7400  
 4661. Samuel Forest, San Diego 92103-4803  
 4662. Sandi Covell, San Francisco 94112-1401  
 4663. Sandra A McLaughlin, Oceanside 92057-7013  
 4664. Sandra Arthur, Camarillo 93012-6904  
 4665. Sandra Blackburn, La Puente 91744-3517  
 4666. Sandra Briggs, Riverside 92506-5124  
 4667. Sandra Buck-Moyer, Atascadero 93422-6128  
 4668. sandra butler, Los Angeles 90045-2753  
 4669. Sandra Christopher, Burbank 91505-1856  
 4670. Sandra Cope, Irvine 92612-8621  
 4671. Sandra Fernandez, Los Angeles 90004-2532  
 4672. Sandra Gamble, Ridgecrest 93555-5118  
 4673. Sandra Gather, Roseville 95747-4606  
 4674. Sandra Hayden, San Jose 95112-7422  
 4675. Sandra K Legan, Brentwood 94513-6356  
 4676. Sandra McPherson, Davis 95616-5918  
 4677. sandra neveras, Royal Oaks 95076-9138  
 4678. sandra schachter, Carmel Valley 93924-9618  
 4679. Sandra Schlesinger, Sausalito 94965-1439  
 4680. Sandra Stauffacher, Mission Viejo 92692-3505  
 4681. Sandra Taylor, Paradise 95969-5760  
 4682. Sandra Wilson, Clayton 94517-9767  
 4683. Sandra Zwemke, Los Gatos 95033-8514  
 4684. Sandy D'Annunzio, Piedmont 94611-3909  
 4685. Sandy Funk, El Segundo 90245-4814  
 4686. Sandy Kasper, Hemet 92544-5019  
 4687. Sandy Paganucci, Santa Rosa 95404-1764  
 4688. Sandy Parbury, Concord 94518-4106  
 4689. Sandy Parker, Yorkville 95494-9204  
 4690. Sandy Vernon, Visalia 93292-1457  
 4691. Sandy Young, Huntington Beach 92646-3419  
 4692. Sandy Zelasko, Valley Center 92082-7635  
 4693. Santana Cantu, Redding 96003-4335  
 4694. Sara Compean, Chino 91710-2639  
 4695. Sara David-Feyh, Ventura 93003-7349  
 4696. Sara Fogan, Valencia 91385-0552  
 4697. Sara Fung, Santa Rosa 95405  
 4698. sara golden, San Diego 92105-5624  
 4699. Sara Hayes, Long Beach 90814-2369  
 4700. Sara Hayes, Long Beach 90814-7531  
 4701. Sara Katz, Manhattan Beach 90266-4838  
 4702. Sara Kay Emerson, 29 Palms 92277  
 4703. Sara Niccolls, Larkspur 94977-0524  
 4704. Sara Rockabrand, Goleta 93117-6214  
 4705. Sara Smith, San Luis Obispo 93401-2621  
 4706. Sara Tanke, Menlo Park 94025-3473  
 4707. Sara Templeton, San Francisco 94112-2459  
 4708. Sara Williams, Reseda 91335-6429  
 4709. Sara Woodburn, Santa Barbara 93101-4916  
 4710. Sarah Bellem, Felton 95018-9432  
 4711. Sarah Bender, Encinitas 92024-3052  
 4712. Sarah Brady, Los Angeles 90026-2906  
 4713. Sarah Brandt, Redwood City 94063-1554  
 4714. Sarah BURNS, Valley Glen 91401-3033  
 4715. Sarah Cahill, Berkeley 94705-2305  
 4716. Sarah Dorrance, San Francisco 94110-3333  
 4717. Sarah Dupree, Carlsbad 92009-3035  
 4718. Sarah Friedman, Downey 90241-4379  
 4719. Sarah Hearon, Santa Barbara 93103-1933  
 4720. Sarah Kales, Orange 92868-1738  
 4721. Sarah Kass, Mill Valley 94941-1549  
 4722. Sarah Letoile, San Francisco 94129-2815  
 4723. Sarah Simpson, Los Gatos 95033-9409  
 4724. Sarah Smith, Rancho Santa Margarita 92688-  
 4725. Sarah Sparks, Nevada City 95959-8559  
 4726. sarah stevens, Martinez 94553-3592  
 4727. Sarah Valentine, Saratoga 95070  
 4728. Sarah Yang, Long Beach 90813-3259  
 4729. Saran Kirschbaum, Los Angeles 90035-4110  
 4730. Sarosh Patel, Sunnyvale 94087-4610  
 4731. Satish Kandisetty, Sacramento 95829-9573  
 4732. Saul Hernandez, San Jose 95110-3013  
 4733. Sauw Ng, Irvine 92623-9307  
 4734. Savannah Blackwell, San Francisco 94117-3735  
 4735. Schuyler Kent, Los Angeles 90020-4731  
 4736. Scott Amundson, Oakland 94602-4006  
 4737. Scott Barlow, Sunnyvale 94087-4456  
 4738. Scott Bravmann, San Francisco 94115-4207  
 4739. Scott Burns, Venice 90291-4619  
 4740. Scott Clements, Davis 95616-2168  
 4741. Scott Coahran, Los Banos 93635-4055  
 4742. Scott Dunn, Santa Cruz 95060-4434  
 4743. Scott Gabel, Aliso Viejo 92656-1800  
 4744. Scott Gerow, San Leandro 94577-2421  
 4745. Scott Jung, South Pasadena 91030-4134  
 4746. Scott Kinaman, Castro Valley 94546-1402  
 4747. Scott Lorigan, Elk Grove 95624-2015

4748. Scott Mason, Tarzana 91356-1326  
 4749. Scott Miller, Oakland 94608-2810  
 4750. Scott Morrison, Oakland 94611-2703  
 4751. Scott Schlachter, San Jose 95118-2110  
 4752. Scott Shulimson, Scotts Valley 95066  
 4753. Scott Smith, Corona 92879  
 4754. Scott Sveinson, Woodland 95695-6813  
 4755. Sean Bishop, San Diego 92116-2204  
 4756. Sean Cosgrave, Victoria 23400  
 4757. Sean Curtice, San Diego 92109-1325  
 4758. Sean Egan, Campo 91906-3169  
 4759. Sean Lagonegro, Burbank 91501  
 4760. Sean Wayland, Rohnert Park 94928-1879  
 4761. Senta Raper, Santa Paula 93060-2435  
 4762. Sepi Yagoobian, Esq, West Hollywood 90069-  
 4763. Seren Bradshaw, Westwood 96137  
 4764. Sergi Goldman-Hull, Oakland 94601-3823  
 4765. Sets Furuike, Summerland 93067  
 4766. Severita Trujillo, San Jose 95128-1107  
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 4768. Seychelle Cannes, Newport Beach 92660-6147  
 4769. Sha Davies, Redding 96001  
 4770. Shahin Rad, Laguna Niguel 92607-6573  
 4771. Shahrokh Mirjahangir, Huntington Beach 92646-  
 4772. Shana Garcia, San Dimas 91773-7115  
 4773. Shandon Schmeiske, Applegate 95703-0676  
 4774. Shane Coburn, Los Angeles 90066-4801  
 4775. Shane Yellin, Carlsbad 92008-4218  
 4776. Shani Casella, Oxnard 93035-1060  
 4777. Shani Murray, Placentia 92870-2102  
 4778. Shannon Brown-Stayer, Gualala 95445-8705  
 4779. Shannon Flynn, Temecula 92592-2423  
 4780. Shannon Healey, San Carlos 94070-2334  
 4781. Shannon Littrell, Carlsbad 92008-1888  
 4782. Shannon Patty, Riverside 92509-6277  
 4783. Shannon Schneble, San Francisco 94110-5710  
 4784. Shanovia Escoc, La Canada Flt 91012-5231  
 4785. shanovia 'navee' escoc, La Canada Flt 91012  
 4786. Sharan Magnuson, Thousand Oaks 91362-4929  
 4787. Shari Amos, Sacramento 95815-1531  
 4788. Shari Canete, San Diego 92128-6254  
 4789. Shari Forbes, Redlands 92374-6276  
 4790. Sharla Dashew, San Francisco 94131-3129  
 4791. Sharon Afamson, Roseville 95747-7297  
 4792. Sharon archibald, Fairfield 94533-7085  
 4793. Sharon Brogan, Bakersfield 93304-1351  
 4794. Sharon Byers, Downey 90242-4831  
 4795. Sharon Camhi, San Francisco 94121  
 4796. Sharon Feissel, Santa Rosa 95409-4358  
 4797. Sharon Fitzgerald, Novato 94945-3284  
 4798. Sharon Ford, Orange 92866-1513  
 4799. Sharon Greco, Palm Springs 92262-2945  
 4800. Sharon Griffin, San Diego 92110-1225  
 4801. Sharon Hafner, Eureka 95503-9773  
 4802. Sharon Hull, Santa Cruz 95062-2857  
 4803. Sharon Kaplan, Santa Cruz 95060-4304  
 4804. Sharon Kocher, Sebastopol 95472-6411  
 4805. sharon lacy, Sebastopol 95472-4261  
 4806. Sharon Lieberman, Annapolis 95412-9752  
 4807. Sharon Lombard, Redondo Beach 90277-3407  
 4808. sharon mulkey, Oceano 93445-8961  
 4809. Sharon Nicodemus, Sacramento 95821-5642  
 4810. Sharon Rodrigues, Fremont 94539-3738  
 4811. Sharon Rollins, Bellflower 90706-7035  
 4812. Sharon Scull, Pasadena 91103-1141  
 4813. Sharon Steuer, San Francisco 94110  
 4814. Sharon Sullivan, South Lake Tahoe 96150-3059  
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 4816. Sharon Tuttle, Arcata 95521-9699  
 4817. Sharon Walsh, Lotus 95651  
 4818. Sharon Wolfe, Oakland 94607-2454  
 4819. Sharyl Swink, Granada Hills 91344-4805  
 4820. Shaula Walko, Hemet 92544-9294  
 4821. Shaun Mulhall, Rocklin 95765-5419  
 4822. shawn heiser, Daly City 94015-4630  
 4823. Shawn Johnson, Encinitas 92024-4552  
 4824. Shawn Jones-Bunn, Avila Beach 93424  
 4825. Shawn Lindahl, San Francisco 94131-2739  
 4826. Shawn Robertson, Oakland 94619-3020  
 4827. Shawnis Tinker, Redwood City 94061-1913  
 4828. sheila blake, Pismo Beach 93449-2439  
 4829. Sheila Carnegie, San Rafael 94901-2127  
 4830. Sheila Desmond, Cameron Park 95682-9130  
 4831. Sheila Martinez, Santa Maria 93455-1687  
 4832. sheila mickelson, Westchester 90045-1465  
 4833. Sheila Satin, Oakland 94618-1800  
 4834. Sheila Silan, Somerset 95684-9280  
 4835. Sheila Willens, Los Angeles 90046-1235  
 4836. Sheila Wolff, Hemet 92543-6823  
 4837. Shelby Kinney-Lang, Irvine 92617-4355  
 4838. Sheldon Kasdan, Los Angeles 90035-3217  
 4839. Shellee Davis, Cotati 94931-9629  
 4840. Shelley Snow, Paso Robles 93446-2821  
 4841. Shelley Strohm, Los Angeles 90025-3087  
 4842. Shellie Vermeer, Laguna Hills 92653-4481  
 4843. Shereen Hawkins, Huntington Beach 92648-1423  
 4844. Sheri Fogarty, Encinitas 92024-5603  
 4845. Sheri Hill, Santa Maria 93458  
 4846. Sheri Watson, Roseville 95661-3674  
 4847. Sherman Lewis, Hayward 94542-1616  
 4848. Sherra Picketts, San Francisco 94117-2520  
 4849. Sherrie Lee, Covelo 95428-9741  
 4850. sherry breitigam, Yountville 94599-3052  
 4851. sherry conable, Santa Cruz 95060-2734  
 4852. Sherry Ortega, Mariposa 95338-8536  
 4853. Sherry Scorer, Los Angeles 90046-2849  
 4854. Sherry Vatter, Los Angeles 90034-8105  
 4855. Sherryl Beamon, Oakland 94605-4824  
 4856. Sherwin Chew, Oakland 94610-2214  
 4857. Sheryl Dunn, San Diego 92128-4079

4858. Sheryl Hamblin, Santa Ana 92704-7076  
 4859. Sheryl Peters, Scotts Valley 95066-2645  
 4860. shianna hardy, Barstow 92311-2735  
 4861. Shiela Cockshott, Belmont 94002-3019  
 4862. Shireen Nickel, Weed 96094-2582  
 4863. Shirley Baird, Atascadero 93422-6833  
 4864. Shirley Cofresi, Applegate 95703-0468  
 4865. Shirley Drush, JAMESTOWN 95327  
 4866. Shirley Harris, Upland 91784-2006  
 4867. Shirley Harris, Willits 95490-8536  
 4868. Shirley Jensen, Santa Maria 93454-5304  
 4869. Shirley Le Garde, Pacoima 91331-7605  
 4870. Shirley Maclean, Santee 92071-3100  
 4871. Shirley McNeal, Berkeley 94703-1110  
 4872. Shirley Mercado, Concord 94518-1826  
 4873. Shirley Sheffield, Oakland 94601-2007  
 4874. Shirley Stroup, Los Osos 93402-6057  
 4875. Shirley Wildanger, Roseville 95747-5827  
 4876. Shondeya Betari, Santa Cruz 95060-6039  
 4877. Shoshannah Stern, Los Angeles 90068-2168  
 4878. Siamak Vossoughi, San Francisco 94115-2138  
 4879. Siena Watson, San Jose 95124-4933  
 4880. Silva Harr, Concord 94521-2205  
 4881. Silver Hartman, Tahoma 96142  
 4882. Silvia Newhall, Chico 95926-2914  
 4883. Simone Alves, Hermosa Beach 90254-0287  
 4884. Simone Haslam, Petaluma 94952-9542  
 4885. simone Siebert, Cardiff 92007-2002  
 4886. Singer, Oakland 94607  
 4887. Siobhan Field, Oakland 94611-4869  
 4888. Sister Gloriamarie Amalfitano, San Diego 92111  
 4889. Sivan Siman-Tov, Sherman Oaks 91403-5631  
 4890. Skot McDaniel, Novato 94947  
 4891. Skye Peace, Sherman Oaks 91403-2021  
 4892. Smiley Simental, Rialto 92376-7241  
 4893. Socrates Calderon, Spring Valley 91977-4723  
 4894. sofia Okolowicz, Temecula 92592-9686  
 4895. Sondra Boes, Campbell 95008-5123  
 4896. Sondra Cummings, Ripon 95366-2630  
 4897. Sonia Chavez, Canoga Park 91303-1127  
 4898. Sonia Lotfabadi, Glendale 91208-1664  
 4899. Sonia Moscardon, San Francisco 94112-2233  
 4900. Sonia Nuño, Coachella 92236-6824  
 4901. Sonja DeRose, Foresthill 95631-0279  
 4902. Sonja Malmuth, Santa Ynez 93460-9675  
 4903. Sonny Chen, San Gabriel 91776-1890  
 4904. Sophia Pelafigue, Arcata 95521-4803  
 4905. Sophia Smith, San Jose 95127-1319  
 4906. Soraya Dosaj, Valley Glen 91401-2429  
 4907. Stacey Han, Oakland 94610-1107  
 4908. Stacey McDonald, Thousand Oaks 91361-5004  
 4909. Stacey Rohrbaugh, Willits 95490-8722  
 4910. Stacey Torigian, Fresno 93704-6027  
 4911. Stacy Cornelius, Laguna Beach 92651-1846  
 4912. Stacy Hall, San Diego 92104-2926  
 4913. Stacy Rouse, Malibu 90265-4754  
 4914. Stacy Thompson, Rancho Cucamonga 91701  
 4915. Stan Fitzgerald, San Jose 95135-2129  
 4916. Stanley Stefancic, San Rafael 94901-1748  
 4917. Stefanie Kaku, Carmel 93922-0554  
 4918. Steffanie Gee, Los Angeles 90064-2484  
 4919. Stella Smith, Norwalk 90650-4924  
 4920. Stephan Silen, San Anselmo 94960-1134  
 4921. Stephanie Beezley, Livermore 94551-6726  
 4922. STEPHANIE CALOIA, Oakland 94612-3101  
 4923. Stephanie Chen, Gardena 90247-2922  
 4924. Stephanie Cheng, San Francisco 94158-2305  
 4925. Stephanie Darling, San Francisco 94133-3910  
 4926. Stephanie davis mcwilliams, Milpitas 95035-5206  
 4927. Stephanie Fazzare, Placentia 92870-6445  
 4928. Stephanie Gale, Van Nuys 91401  
 4929. Stephanie Greenwald, Long Beach 90808-1435  
 4930. Stephanie Herron, Fair Oaks 95628-3817  
 4931. Stephanie Hillman, Arcata 95518-4166  
 4932. Stephanie Nelson, Victorville 92392-8637  
 4933. Stephanie Nunez, Van Nuys 91405-3142  
 4934. Stephanie Reader, Los Altos 94024-4028  
 4935. Stephanie Rexing, San Francisco 94109-7011  
 4936. Stephanie Richards, Los Angeles 90036-5218  
 4937. Stephanie Swain, Santa Rosa 95404-8805  
 4938. Stephen Andersen, San Mateo 94404-2052  
 4939. Stephen Bohac, Twain Harte 95383-1730  
 4940. Stephen Donahue, Carmel 93923-9332  
 4941. Stephen Fitch, Thousand Oaks 91362-2051  
 4942. Stephen Fugita, San Jose 95136-1434  
 4943. Stephen Hams, Los Altos 94022-2220  
 4944. Stephen Hendricks, Kelseyville 95451-7072  
 4945. Stephen Hufstader, El Sobrante 94803-1142  
 4946. Stephen Julich, Berkeley 94702-1002  
 4947. stephen pucci, Richmond 94804-7478  
 4948. Stephen Rosenblum, Palo Alto 94301-3939  
 4949. Stephen Sharnoff, Berkeley 94708-1602  
 4950. Stephen Snyder, Ukiah 95482-5634  
 4951. Stephen Stockman, Cathedral City 92234-4042  
 4952. stephen Yelich, Arcadia 91006-1913  
 4953. Stevan Bosanac, Petaluma 94952-7504  
 4954. Steve Baker, Foster City 94404  
 4955. Steve Bianchi, Newcastle 95658-9302  
 4956. Steve Bollock, Mount Shasta 96067-9606  
 4957. Steve Brown, Moss Beach 94038-9761  
 4958. Steve Burtch, Ventura 93001-3311  
 4959. Steve Cohen, Valencia 91354-1819  
 4960. Steve Crase, Antioch 94509-1843  
 4961. Steve Eklund, Salinas 93901-1337  
 4962. Steve Finnegan, Sebastopol 95472-5757  
 4963. Steve Fleming, Gualala 95445  
 4964. Steve Hanlon, Los Angeles 90049-2336  
 4965. Steve Iverson, Newport Beach 92660-7330  
 4966. Steve Johnson, San Rafael 94903-3318  
 4967. Steve Linton, San Ramon 94583-3311

4968. Steve Ozoa, Milpitas 95035-3170  
 4969. Steve Sato, Los Angeles 90042-5108  
 4970. Steve Sketo, Bakersfield 93312-5144  
 4971. Steve Smith, Santa Barbara 93101-4929  
 4972. Steve Sugarman, Malibu 90265-0923  
 4973. Steve Swihart, Walnut Creek 94595-1635  
 4974. Steve Walsh, Mill Valley 94941-1803  
 4975. Steve Walters, San Diego 92117-1111  
 4976. Steve Wexler, Camarillo 93010-6631  
 4977. Steve Wittig, Roseville 95678-6405  
 4978. Steve Wright, Sunnyvale 94089-5847  
 4979. Steve Zera, Vista 92081-5477  
 4980. SteveLoe Loe, Yucaipa 92399-2337  
 4981. Steven Berman, Berkeley 94703-1663  
 4982. Steven Collins, San Francisco 94107-5526  
 4983. Steven Cook, Big Bear Lake 92315-3037  
 4984. Steven Cruz, San Jose 95126-4821  
 4985. Steven Dungan, Lodi 95242-9186  
 4986. Steven Eliscu, Palo Alto 94306-3144  
 4987. Steven England, San Ramon 94582-5060  
 4988. Steven Glynn, San Francisco 94102-1704  
 4989. Steven Hernandez, Long Beach 90802-3640  
 4990. Steven Hibshman, Foster City 94404-2751  
 4991. Steven Korson, Riverside 92503-4264  
 4992. Steven Lamers, San Bernardino 92404-3015  
 4993. Steven Millard, Grass Valley 95945-9015  
 4994. Steven Nielsen, Santa Rosa 95403-1594  
 4995. Steven Plank, San Miguel 93451-0085  
 4996. Steven Roesch, Fresno 93703-1729  
 4997. Steven Schlam, San Diego 92104-4145  
 4998. Steven Smith, Atascadero 93422  
 4999. Steven Twohy, San Jose 95139-1143  
 5000. Steven Verschoor, Newbury Park 91320-2836  
 5001. Steven Wallis, Carnelian Bay 96140  
 5002. Steven Wallis, Carnelian Bay 96140-0164  
 5003. Steviann Yanowitz, Van Nuys 91406-6219  
 5004. Stoney Hooker, San Diego 92121-1522  
 5005. Sudeep Johnson, Menlo Park 94025-1841  
 5006. Sudia Paloma, Berkeley 94705-1805  
 5007. Sue Fox, Sausalito 94965-1463  
 5008. Sue Habegger, Grass Valley 95949-9140  
 5009. Sue Hansen, San Anselmo 94960-1341  
 5010. sue harrington, martinez 94553-3635  
 5011. Sue Harrison, Sunnyvale 94087-5825  
 5012. sue stokeld, San Francisco 94103-3395  
 5013. Sue Struthers, Riverside 92506-2502  
 5014. Sue Walden, San Francisco 94109-3482  
 5015. Sue Windes, Murrieta 92562-3583  
 5016. Sue Zipp, Novato 94948-1206  
 5017. Summer Rhee-Pizano, Capitola 95010-2448  
 5018. sunny powell, Rohnert Park 94928-2601  
 5019. Susaan Aram, Laguna Beach 92651-2829  
 5020. Susan Ashlock, Santa Barbara 93101-1224  
 5021. Susan Booras, San Carlos 94070-3439  
 5022. Susan Carlson, Davis 95616-5621  
 5023. susan cayco, Fresno 93722-5256  
 5024. Susan Ceriani, Valley Village 91607-4325  
 5025. Susan Chancey, Sacramento 95821-5632  
 5026. Susan Chandler, South Lake Tahoe 96158-1528  
 5027. Susan Cohen, Walnut Creek 94597-3962  
 5028. Susan Davenport, Simi Valley 93063-7423  
 5029. SUSAN DAVIS, Richmond 94801-3860  
 5030. Susan Godfrey, Alameda 94502-6620  
 5031. Susan Gosland, Diamond Bar 91765-4539  
 5032. Susan Grant-Lee, San Diego 92116  
 5033. Susan Hales, Berkeley 94704-2186  
 5034. susan howe, Oceano 93445-9126  
 5035. Susan Just, Sacramento 95824-1909  
 5036. Susan Kelly, Marshall 94940  
 5037. Susan Kelsey, Westlake Village 91361-3411  
 5038. Susan Kontich, Fremont 94536-6752  
 5039. Susan Kornfeld, Los Angeles 90039-1734  
 5040. Susan Kralj, Lodi 95240-7203  
 5041. Susan Landphere, Granada Hills 91344-3243  
 5042. Susan Lee, San Diego 92116-2312  
 5043. Susan Lilly, Winnetka 91306-4242  
 5044. Susan Lord, Tarzana 91356  
 5045. Susan Lord, Tarzana 91356-4417  
 5046. Susan Lynch, Pacific Palisades 90272-3909  
 5047. Susan Manning, San Francisco 94109-5048  
 5048. Susan McMullen, Lemon Grove 91945-1327  
 5049. Susan Mokolke, Portola Valley 94028-8142  
 5050. Susan Nichols, Playa Del Rey 90293-8169  
 5051. Susan Norman, truckee 96162  
 5052. Susan Oliver, San Diego 92111-2514  
 5053. Susan Peters, San Rafael 94901-5232  
 5054. Susan Price, Simi Valley 93063-3743  
 5055. Susan Pursche, Corona 92882-3051  
 5056. Susan Randerson, San Diego 92106-2914  
 5057. Susan Sherman, Sacramento 95812-1198  
 5058. Susan Sloan, Los Angeles 90064-2679  
 5059. susan spencer, San Francisco 94109-2438  
 5060. Susan Summers, Carmichael 95608-2727  
 5061. susan Tatsui-D'Arcy, Santa Cruz 95063-2988  
 5062. susan turner, Newark 94560-3150  
 5063. Susan Updegrove, San Luis Obispo 93401-5914  
 5064. Susan Vergne, Oakland 94610-1149  
 5065. Susan Walp, Pasadena 91103-2722  
 5066. Susan Watts-Rosenfeld, Riverside 92506-5843  
 5067. Susan Whitaker, Auburn 95603-4118  
 5068. Susan Witt, Berkeley 94707-1828  
 5069. Susan Wittenberg, El Cerrito 94530-1815  
 5070. susan zalon, Santa Barbara 93110-2426  
 5071. Susann Taylor Shier, Santa Monica 90405-4348  
 5072. Susanne Bader, Grass Valley 95945-6338  
 5073. Susanne Isom, Santa Rosa 95404-7625  
 5074. Susi Higgins, Glendale 91203-1221  
 5075. Susie and Ken Vanderlip, Orange 92869-4302  
 5076. Susie Duff, Malibu 90264-6314  
 5077. Susie Lee, La Habra 90631-7018

5078. Susie Leikam, Indio 92203-7493  
 5079. Suzan Lins, Sugarloaf 92386-1087  
 5080. Suzanne a'Becket, Cupertino 95014-5707  
 5081. Suzanne Alon, Van Nuys 91401-2910  
 5082. Suzanne Cooper, Los Angeles 90018-2948  
 5083. Suzanne Deerlyjohnson, Long Beach 90806-4707  
 5084. Suzanne Evans, San Jose 95125-3301  
 5085. Suzanne Jones, Berkeley 94709-1438  
 5086. Suzanne Kent, Santa Cruz 95060-3126  
 5087. Suzanne Kuba, Danville 94506-2060  
 5088. suzanne lande, Sebastopol 95472-3530  
 5089. Suzanne Levin, Santa Clara 95051-4719  
 5090. Suzanne McGee, Berkeley 94705-1632  
 5091. Suzanne Miller, San Diego 92109-3660  
 5092. suzanne narducy, San Clemente 92673-3101  
 5093. Suzanne Newman, Orinda 94563-2228  
 5094. Suzanne Pena, Fullerton 92835-3012  
 5095. Suzanne Rocca-Butler, Menlo Park 94025-6749  
 5096. Suzanne Rollo, Oroville 95966-6113  
 5097. Suzanne Saul, Oakland 94619-2402  
 5098. Suzon Kornblum, Pleasanton 94566-5416  
 5099. Sven-Erik Rose, Davis 95618-4963  
 5100. Syd Rumford, Long Beach 90808-1025  
 5101. Sydney Berner, Covina 91722-3337  
 5102. Sydney Lee Berner, Covina 91722-3337  
 5103. Sydney Moreau, Palm Springs 92264-5569  
 5104. Sydney Pitcher, Lemon Grove 91945-4317  
 5105. Sydney Ricks, Fresno 93722-1101  
 5106. Sylvia Banta, Redlands 92374-6465  
 5107. Sylvia Cardella, Hydesville 95547-9416  
 5108. Sylvia Griggs, Lafayette 94549  
 5109. Sylvia Marie, Sebastopol 95473-1019  
 5110. Sylvia Sanchez, San Jose 95116-4201  
 5111. T Acuna, Culver City 90230-4712  
 5112. Takame Stephens, Oceanside 92056-5141  
 5113. Tal Kayatsky, Los Angeles 90042-4607  
 5114. Tal Kinnersly, Itoigawa 94913  
 5115. Talida Nechifor, Riverside 94501  
 5116. Tamana Beria, San Ramon 94582-5197  
 5117. Tamar Carson, oakland 94609  
 5118. Tamara Gates, San Diego 92128-2095  
 5119. Tamara Hulsey, El Cajon 92020-2353  
 5120. Tamara Matz, Los Angeles 90016-5105  
 5121. Tamara Napier, Newbury Park 91320-2056  
 5122. Tamara Persky, Ojai 93023-2707  
 5123. Tamara Voyles, Sebastopol 95472-5303  
 5124. Tamera Dolcini, Riverside 92505-1871  
 5125. Tami Armitage, Studio City 91604-1351  
 5126. Tami Roos, Saratoga 95070-5648  
 5127. Tammy Davis, Los Angeles 90014-2311  
 5128. Tandi Cline, Sacramento 95831-1368  
 5129. tandy beal, Felton 95018-9011  
 5130. Tansy Woods, San Diego 92101-1909  
 5131. Tanya Goodman, Los Angeles 90027-1404  
 5132. Tanya mesirow, Temecula 92590-5805  
 5133. Tanya Wilson, Glendale 91202-1235  
 5134. Tara Holmes, San Francisco 94117-4527  
 5135. Tara Owens, Santa Barbara 93111-2233  
 5136. Tara Strand, North Hollywood 91601-4267  
 5137. Tara Thralls, Point Reyes Station 94956-1282  
 5138. Tasha Boucher, Sherman Oaks 91403-4625  
 5139. Tasha Elkovitch, San Diego 92102-2809  
 5140. Tatyana Shats, San Francisco 94109-5390  
 5141. Tawna Farmer, Tiburon 94920-1110  
 5142. Tawny Sherrill, Garden Grove 92845-1940  
 5143. taylore sinclair, Costa Mesa 92627-0136  
 5144. Taylur Denning, Vallejo 94591-6631  
 5145. Teal McConn, Livermore 94551-6725  
 5146. Ted Fishman, San Jose 95123-2639  
 5147. Ted Milkoff, Santa Rosa 95404-1306  
 5148. Ted Myers, Santa Monica 90403-4364  
 5149. Tera Rapp, Santa Margarita 93453-0586  
 5150. terance tashiro, Los Angeles 90045-2751  
 5151. Teresa Bennett, Santee 92071-3368  
 5152. Teresa Bippert-Plymate, Big Bear City 92314  
 5153. Teresa House Hedani, Pittsburg 94565-6266  
 5154. Teresa Matta, Colfax 95713-9462  
 5155. Teresa Mynko, Lake Elsinore 92530-8324  
 5156. Teresa Yrastorza, Berkeley 94702-2021  
 5157. Teri Gibson, Malibu 90265-4135  
 5158. Teri Lunn, Petaluma 94954-1526  
 5159. Teri McCartney, San Marcos 92069-5703  
 5160. Terri Angelich, Redondo Beach 90277-6407  
 5161. Terri Haase, Gardena 90248-3605  
 5162. Terri Orth-Pallavicini, San Francisco 94109-3271  
 5163. Terri Roberts, Los Angeles 90068-3103  
 5164. Terri Trammell, San Juan Capistrano 92675-4601  
 5165. Terry Blount, San Jose 95110-2761  
 5166. Terry Brejla, Sonoma 95370-9652  
 5167. Terry Church, Petaluma 94952-1647  
 5168. Terry Dyksinski, Morro Bay 93442-1440  
 5169. Terry Licals, Castro Valley 94546-2401  
 5170. Terry Peterson, Imperial Beach 91932-2035  
 5171. Terry San Cartier, Santa Maria 93455  
 5172. Thalia Lubin, Woodside 94062-4166  
 5173. Thamar Wherit, Mount Shasta 96067-0708  
 5174. Thao Pham-Aaltonen, Huntington Beach 92647  
 5175. Theodore Baumgart, La Crescenta 91214-3137  
 5176. Theodore C Snyder, Granada Hills 91344-1062  
 5177. Theresa Ames, Ventura 93001-4460  
 5178. Theresa Capanis, Bonita 91902  
 5179. Theresa Castillo, Sacramento 95842-2822  
 5180. Theresa Ellen Strunk, Los Osos 93402-2106  
 5181. Theresa Longo, Riverside 92504-9563  
 5182. Theresa Owens, Eureka 95501-2757  
 5183. Theresa Rogers, Rohnert Park 94928-2278  
 5184. Theresa Shiels, Half Moon Bay 94019  
 5185. Theresa Winchell, Julian 92036-0164  
 5186. Theresa Winterling, Atherton 94027-3843  
 5187. Therese Brittain, Fallbrook 92028-3538

5188. therese lentz, Pasadena 91107-3856  
 5189. Therese Ryan, Palmdale 93550-2569  
 5190. Thi Ton-Olshaskie, Arroyo Grande 93420  
 5191. Thomas Augustitus, Carmel Valley 93924-9754  
 5192. Thomas Bornheimer, San Francisco 94115-1103  
 5193. Thomas Bostick, Whittier 90604-3508  
 5194. Thomas Canning, Calabasas 91302-2238  
 5195. Thomas Carnesi, Torrance 90501-3109  
 5196. Thomas Daniel, Greenfield 93927-9701  
 5197. Thomas Filip, Moorpark 93020-1332  
 5198. Thomas Gould, Cambria 93428-2913  
 5199. Thomas Gourley, Richmond 94804-4555  
 5200. Thomas Hazelleaf, Seal Beach 90740-3056  
 5201. thomas jones, Berkeley 94708-1549  
 5202. Thomas Knecht, MD, PhD, Avila Beach 93424  
 5203. thomas L, Los Angeles 90031-2067  
 5204. Thomas Lilienthal, Richmond 94804-7413  
 5205. Thomas Mcfarlan, Redondo Beach 90277-5841  
 5206. Thomas Nulty Jr, Dana Point 92629-3007  
 5207. Thomas Rossi, Sun Valley 91352-1918  
 5208. Thomas Ruddy, San Diego 92124-4005  
 5209. Thomas Rummel, San Diego 92104-2562  
 5210. Thomas Savino, Burbank 91506-1329  
 5211. Thomas Scharffenberger, San Francisco 94121  
 5212. Thorin Tabor, Temecula 92591-3752  
 5213. Tiffany Forbes, Orinda 94563-6383  
 5214. Tiffany Hom, Pasadena 91107-4405  
 5215. Tiffany Story, Summerland 93067-1253  
 5216. Tiffany Wong, San Diego 92127-3412  
 5217. Tiio-Mai McCurdy, Los Angeles 90028-6752  
 5218. Tim Barrington, San Jose 95112-5237  
 5219. Tim Barrington, San Jose 95126-3273  
 5220. Tim Bentley, Los Angeles 90022-3402  
 5221. Tim Butler, San Francisco 94109-5317  
 5222. Tim Callahan, Orange 92867-6838  
 5223. Tim Hayes, San Diego 92115-6938  
 5224. Tim O'Brien, Belmont 94002-1932  
 5225. Tim Segal, San Jose 95118-2144  
 5226. Tim Wescott, Turlock 95380-4741  
 5227. Timothy Barkwill, Buena Park 90621-1206  
 5228. Timothy Becher, San Luis Obispo 93406-0096  
 5229. Timothy Bock, Santa Clara 95051-3951  
 5230. Timothy Hopwood, Mountain View 94043-6588  
 5231. Timothy Larkin, San Francisco 94109-5337  
 5232. Timothy Michel, Walnut 91789-1237  
 5233. Timothy Moder, Berkeley 94703-1268  
 5234. Timothy Nelson, Silverado 92676-0804  
 5235. Timothy Scott, Norco 92860-1844  
 5236. Tina Ann, Bolinas 94924-0265  
 5237. Tina Borders, Santa Ana 92705-7621  
 5238. Tina Colafranceschi, Whitethorn 95589-0201  
 5239. Tina de Kwaadsteniet, Los Angeles 90290  
 5240. Tina Jaime, San Jose 95124-2801  
 5241. Tina Johnson, Garden Grove 92845-1538  
 5242. Tina Kosha, Los Angeles 90066-1921  
 5243. Tina Panning Labate, San Clemente 92673-2720  
 5244. Tina Seifert, Aptos 95003-3519  
 5245. Tinka Friend, Riverside 92503-5317  
 5246. Tisha Douthwaite, Ukiah 95482-1386  
 5247. Tobias Mehler, Topanga 90290-3251  
 5248. Todd Benton, Bonsall 92003-3204  
 5249. Todd Board, Glen Ellen 95442-9704  
 5250. Todd Cachopo, Santa Clara 95051-3842  
 5251. Todd Fisk, San Diego 92131-3573  
 5252. Todd Kalionzes, Signal Hill 90755-2148  
 5253. Todd Peterson, Anaheim 92805-7516  
 5254. Tom Behlmer, Grass Valley 95945-7800  
 5255. Tom Burt, Santa Barbara 93110-1251  
 5256. Tom Carlton, Culver City 90232-3719  
 5257. Tom Feldman, La Canada Flintridge 91011-2020  
 5258. Tom Fitzpatrick, West Hollywood 90048-2564  
 5259. Tom Fuerte, San Jose 95118-2124  
 5260. Tom Hollenbeck, Carlsbad 92009-7713  
 5261. Tom Smith, Oakhurst 93644-8757  
 5262. Tom Trainum, Windsor 95492  
 5263. Tomiko Edmiston, Royal Oaks 95076-9020  
 5264. Toni Gilmont, San Juan Capistrano 92675-6715  
 5265. Tony Kelley, Sacramento 95821-0072  
 5266. Tony Venegas, Winnetka 91306-2203  
 5267. Tower Snow, Napa 94558-9777  
 5268. TR Luberman, Bevrly Hills 90211  
 5269. Tracey Guardian, West Hills 91307-3849  
 5270. Tracey Sands, Newbury Park 91320-4144  
 5271. Traci Moreno, Lancaster 93536-8377  
 5272. Tracy Cheyne, Hemet 92543-7955  
 5273. Tracy Gilbert, Rialto 92377-8831  
 5274. Tracy Harwell, Rancho Cordova 95670-2275  
 5275. Tracy Morris, San Rafael 94903-3048  
 5276. Tracy Turner, Los Alamitos 90720-5243  
 5277. Tracy Wade, Browns Valley 95918-9609  
 5278. tracy watada, Los Angeles 90066-7003  
 5279. Tracy Watt, Elk Grove 95758-6254  
 5280. Travis Buck, San Diego 92107-2526  
 5281. Trevor Long, Visalia 93292-7070  
 5282. Tricia Fortina, Ventura 93002-0300  
 5283. Trillion Donahue, Concord 94520-5452  
 5284. Trina Aurin, Foothill Ranch 92610-2305  
 5285. Trina Snow, Temecula 92592-9246  
 5286. Trisha Hillier, Beverly Hills 90210  
 5287. Trisha Pahmeier, Tarzana 91357-1704  
 5288. Tristan Valliant, San Jose 95117-1652  
 5289. Troy Huff, Turlock 95382-7363  
 5290. Trudy Hartman, MD. , Menlo Park 94025-4750  
 5291. Trudy Morgan, Ukiah 95482-5436  
 5292. TRUSE PRETTO, Richmond 94805-1106  
 5293. Tsipoa Peskin, Berkeley 94707-2311  
 5294. twyla myers, Santa Barbara 93101  
 5295. Tyleen Paige, Cherry Valley 92223-4463  
 5296. Tyler Price, Davis 95616-4703  
 5297. U Burton and FAMILY, Santa Monica 90405

5298. Ulla Rodman, Hermosa Beach 90254-4306  
 5299. V and B Jones, Torrance 90510-5090  
 5300. V Madsen, San Leandro 94577-4027  
 5301. V R Wallace, Whittier 90602-2547  
 5302. Va Johnstone, Santa Barbara 93105  
 5303. Val Sanfilippo, San Diego 92111-5057  
 5304. Valarie Stengle, San Francisco 94112-1916  
 5305. Valerie Beard, Sacramento 95820-3021  
 5306. Valerie Justus-Rusconi, Watsonville 95076-0129  
 5307. Valerie Kline, Arroyo Grande 93420-3401  
 5308. Valerie Lizarraga, Montebello 90640-2563  
 5309. Valerie Ortega, Hollister 95023-5705  
 5310. Valerie Ryden, Camarillo 93010-3221  
 5311. Valerie Watson, Diablo 94528-0348  
 5312. Van Burton, Magalia 95954-9485  
 5313. Vanessa Gomez, Los Angeles 90059-2208  
 5314. Vanessa Rodriguez Sandoval, North Hills 91343  
 5315. Vaughn Hosmann, Bellflower 90706-6574  
 5316. Velene Campbell, Ukiah 95482-9228  
 5317. Velene Campbell, Van Nuys 91401-4200  
 5318. Vera Brown, Redwood City 94065-1338  
 5319. Vera Loewer, Pacifica 94044-4027  
 5320. vera martinez, Cathedral City 92234-2427  
 5321. Verla D Walker, West Covina 91791-2064  
 5322. Veronica Casale, San Diego 92122-5157  
 5323. Veronica Graff, Manhattan Beach 90266-4127  
 5324. Veronica Romero, San Jose 95124-5329  
 5325. Veronica Spinharney, Oceanside 92054-6036  
 5326. Veronika Shishido, Bayside 95524-9379  
 5327. Vic Bostock, Altadena 91001-1819  
 5328. vicente rodriguez, Daly City 94014-1401  
 5329. Vicki & Rod Kastlie, San Diego 92107-2310  
 5330. Vicki Bingaman, Frazier Park 93225-9453  
 5331. Vicki Bingo, Los Angeles 90036-4861  
 5332. vicki brooks, Palo Alto 94301-1501  
 5333. Vicki Edwards, Calistoga 94515-1135  
 5334. Vicki Geehan, Carlsbad 92011-4022  
 5335. Vicki Hieronymus, Pacific Palisades 90272-4517  
 5336. Vicki Osborn-Gagen, Redwood City 94061-3822  
 5337. vicki smith, Walnut Creek 94595-2630  
 5338. vicki tate, Napa 94558-2401  
 5339. Vicki Tomola, San Francisco 94116-1651  
 5340. Vicky Groom, Cloverdale 95425-5444  
 5341. Victor Gray, riverside 92507-2800  
 5342. Victor Magana, Fresno 93710-3717  
 5343. Victoria Arvizu, Desert Hot Springs 92240-1478  
 5344. Victoria Behar, Thousand Oaks 91360-7038  
 5345. Victoria Brandon, Northridge 91325-2407  
 5346. Victoria F Wobermin, Los Osos 93402-4456  
 5347. Victoria Jensen, Santa Monica 90405-2443  
 5348. Victoria Kahn, Borrego Springs 92004-1661  
 5349. Victoria Miller, Encino 91436-1541  
 5350. Victoria Spiers, Berkeley 94703-1572  
 5351. Victoria Wyatt, Crestline 92325-3351  
 5352. Vikram Bhajj, Ruislip 90211  
 5353. Vincent Campisi, Canyon Country 91387-1851  
 5354. Vincent Scrima, Studio City 91604-1317  
 5355. Vincent Weis, Sacramento 95822-2403  
 5356. Vinu Arumugham, San Jose 95132-1470  
 5357. Virdie Block, Sacramento 95822-3344  
 5358. Virgil Nieman, Desert Hot Springs 92241-8398  
 5359. Virginia Fahey Castillo, Danville 94526-5518  
 5360. Virginia Guevara, Glendale 91203-1337  
 5361. Virginia Kohfeld, Santa Monica 90402  
 5362. Virginia Krutilek, Alameda 94501-6331  
 5363. Virginia Madsen, San Leandro 94577-4027  
 5364. Virginia Mareks, Laguna Woods 92637-2355  
 5365. Virginia McNeely, Sacramento 95818-3809  
 5366. Virginia Rapp, Walnut Creek 94595-4481  
 5367. Virginia Watson, Los Angeles 90026-4419  
 5368. Vita Miller, Los Osos 93402-4009  
 5369. Vito Degrigoli, Palm Springs 92262-0322  
 5370. Vivian Hir, San Ramon 94582-3272  
 5371. vivian tucciarone, San Francisco 94115-4348  
 5372. Vonza Thompson, Los Gatos 95033-9107  
 5373. Wallace Heusser, Fresno 93711-7007  
 5374. Wallace Imura, Cupertino 95014-2206  
 5375. Wallace Rhine, Cazadero 95421-9704  
 5376. Walter and Bernadette Brooks, Napa 94558-9722  
 5377. Walter Carter, Covelo 95428-9853  
 5378. Walter D Miller, Calabasas 91302-2308  
 5379. Walter Ramsey, Oakley 94561-3919  
 5380. Walter Zelnick, Novato 94945-2523  
 5381. wanda louise, Irvine 92604-3103  
 5382. Warren Clark, Mammoth Lakes 93546-3328  
 5383. Warren Gold, Mill Valley 94941-5080  
 5384. Warren Hageman, Carmichael 95608-1484  
 5385. Warren Haskell, Chico 95926-2422  
 5386. Warren Salyer, Calexico 92232-9011  
 5387. Wayne Cowley, Camarillo 93010-9282  
 5388. Wayne Gibb, Forestville 95436-9378  
 5389. Wayne Heckman, Ukiah 95482-0846  
 5390. Wayne Jr Enos, Los Angeles 90066-5105  
 5391. Wayne Miller, Newark 94560-2119  
 5392. Wayne Steffes, Redding 96001-2906  
 5393. Wena Dows, Culver City 90230-5401  
 5394. Wendi Marafino, Culver City 90232-3225  
 5395. Wendy Bauer, San Francisco 94112-1835  
 5396. Wendy baus, Los Angeles 90056  
 5397. Wendy Denton, Oakhurst 93644-5026  
 5398. Wendy Hansen, Aromas 95004-9615  
 5399. Wendy Larson, Turlock 95380-4933  
 5400. Wendy Lewis, Brentwood 94513-6133  
 5401. Wendy Monterrosa, Covina 91722-0408  
 5402. Wendy Oser, Berkeley 94702-1027  
 5403. Wendy Roberts, Livermore 94550-5451  
 5404. Wendy Seto, Chino Hills 91709-2852  
 5405. Wendy Weikel, Berkeley 94707-2526  
 5406. wendy wilke, Fresno 93720-1856  
 5407. wendy wu, Laguna Niguel 92677-1824



5408. Whitney Van Herpe, Temecula 92592-1440  
5409. Wilfredo Rodriguez, Campbell 95008-6266  
5410. William Wollner, Stockton 95202-1512  
5411. Will Lebeau, Newport Beach 92661-1422  
5412. Will Schein, Santa Cruz 95060-2948  
5413. Willa Davis, Chula Vista 91913-2608  
5414. William And Sabrina Parham, Irvine 92623-4338  
5415. William Baker, Los Angeles 90042-3523  
5416. William Boosman, Pacific Grove 93950-2619  
5417. William D Couch, Orinda 94563-3234  
5418. William Dahnke, Poway 92064-2362  
5419. William Dudley, Menlo Park 94026-7495  
5420. William Foxall, San Rafael 94901-1210  
5421. William Gammill, San Francisco 94134-1608  
5422. William Graham, Burbank 91502  
5423. William Herman, Petaluma 94952-3023  
5424. William Heuser, Arcadia 91007-6425  
5425. William Hildebrand, Hayward 94541-2605  
5426. William Josephs, Encino 91436-1955  
5427. William Marsh, San Diego 92106-1716  
5428. William Mc Guire, San Francisco 94118-2209  
5429. William McHenry, Anaheim 92804-3303  
5430. William Mcrae, San Diego 92109-4114  
5431. william mittig, Mariposa 95338-8701  
5432. William Musser IV, San Jose 95125-4610  
5433. William Ninde, Concord 94521-5020  
5434. william nowell, Los Angeles 90012-1920  
5435. William Oliver, Glendora 91741-3071  
5436. William Schlesinger, Los Angeles 90046-6810  
5437. William Schoene, Santa Monica 90405-4847  
5438. William Shepard, San Francisco 94121-1203  
5439. William Sosa, Oxnard 93033-3359  
5440. William Sullenberger, Santa Cruz 95060-5210  
5441. William Talbott, Monrovia 91016-2509  
5442. William Tauck, Ventura 93003-5503  
5443. William Turley, Oceanside 92057-4441  
5444. William Vail, Sonoma 95370-8423  
5445. William Wallin, Richmond 94805-2413  
5446. William Weaver, Lincoln 95648-2631  
5447. William Willis, Costa Mesa 92627-2937  
5448. William Bell, Sunnyvale 94087-3348  
5449. Winfield Carson, Poway 92064-4839  
5450. Winston Tormos, Apple Valley 92308-5876  
5451. Wolfgang Rougle, Cottonwood 96022-8205  
5452. Wynn Sasaki, Scotts Valley 95066-3914  
5453. xochilt aviles, Duarte 91010-3118  
5454. Y Chen, Albany 94706-1133  
5455. Yana Stoyanova, Santa Monica 90404-2714  
5456. Yazmin Gonzalez, Bellflower 90706-5820  
5457. Yefim Maizel, San Francisco 94131-1621  
5458. Yen Chou, San Diego 92101-5945  
5459. Yen Pham, El Monte 91732-2896  
5460. Yolanda Moreno, Fresno 93720-4093  
5461. Yuki Nishinaka, El Dorado Hills 95762-5944  
5462. yuko conniff, Los Angeles 90036-4061  
5463. Yuri Yamane, Walnut 91789-1601  
5464. Yves Decargouet, Lucerne 95458-8502  
5465. Yvonne Davis, San Diego 92111-3245  
5466. Yvonne Fisher, Playa Del Rey 90293-8296  
5467. Yvonne Flagg, Riverside 92506-3157  
5468. Yvonne Oelkers, V Isalia 93292  
5469. Yvonne peck, Orangevale 95662-3723  
5470. Yvonne Quilenderino, Seaside 93955-4249  
5471. Zanne deJanvier, San Francisco 94131-3006  
5472. Zeinob Burnham, Capitola 95010-3461  
5473. Zoe Vavrek, Fairfax 94930-2209  
5474. Zorine Rinaldi, Santa Monica 90405-3923  
5475. Zsanine Alexander, Burbank 91504-2702  
5476. C B, Los Angeles 90028-8107  
5477. D G Sifuentes, Mammoth Lakes 93546  
5478. Ms. Lilith, Ventura 93003  
5479. R. Zierikzee, San Francisco 94118-2520  
5480. V & B Jones, City 90510-5090  
5481. V. Grubbs, San Diego 92126-3509  
5482. William Harvey, San Diego 92103-4382



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*We Provide Solutions to Better the World through Innovation*

Monday, February 20, 2017

Elizabeth Scheehle, Branch Chief, Oil and Gas and GHG Mitigation Branch  
California Air Resources Board  
1001 "I" St., Sacramento, CA, 95814

Via Electronic Submittal:

[https://www.arb.ca.gov/lispub/comm/bcsubform.php?  
listname=oilandgas2016&comm\\_period=1](https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=oilandgas2016&comm_period=1)

Ref.: CARB Oil & Gas Methane Rulemaking - Available Technologies for Monitoring Methane Fugitive Emissions

Dear Elizabeth,

Since we last had contact for my testimony at the CARB hearing in Sacramento on July 2016 very exciting new technologies for products and services became commercially available in the US at a very affordable price points !

Safety Scan as a solution provider for the industry is proud to announce that we became authorized reseller and authorized field service provider for such new technologies that the industry already is showing clear signs that they will adopt:



United Electric Vanguard Wireless HART Methane Leak Detector for 24x7 fugitive Emissions monitoring. UE is an American company with almost 100 years based in Boston, MA. Vanguard is a 100% made in the USA

[elias.tobias@safetyscan.org](mailto:elias.tobias@safetyscan.org)

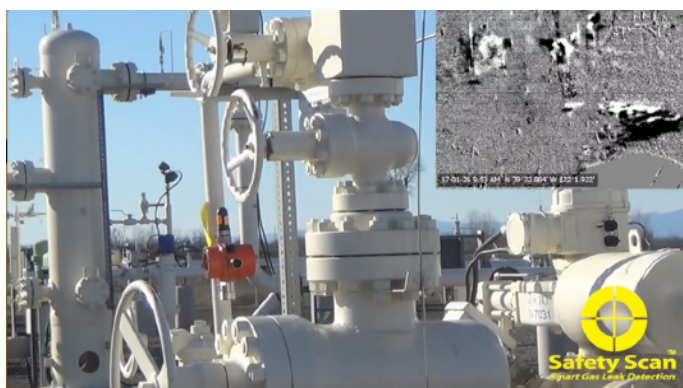
[1 \(323\) 673-1415](tel:13236731415)

More details ?

<http://safetyscan.org/contact/>

Each Vanguard detector has a *WirelessHART* transceiver, an antenna, a display, a long life power module, a gas sensor, and a signal processor for the gas sensor. Vanguard uses a sensor architecture trademarked “Flexsense”, which allows the sensor to identify its target gas and range to a Vanguard transmitter upon connection. It is currently available with either a Methane NDIR sensor or an electrochemical and H<sub>2</sub>S sensor. Current ranges are 0-100% LEL of methane and 0-100 ppm of H<sub>2</sub>S. It is the methane sensing capability that is deployed for detection of greenhouse gases.

### Industry challenge addressed



Reducing methane is a challenge for the oil & gas industry, as is compliance with emerging regulation. The U.S. Environmental Protection agency has estimated that the U.S. petroleum and natural gas industry contribute 24.1 percent of the methane into the atmosphere. They also designate methane as a significantly more powerful greenhouse gas as carbon dioxide – 25 more potent per molecule

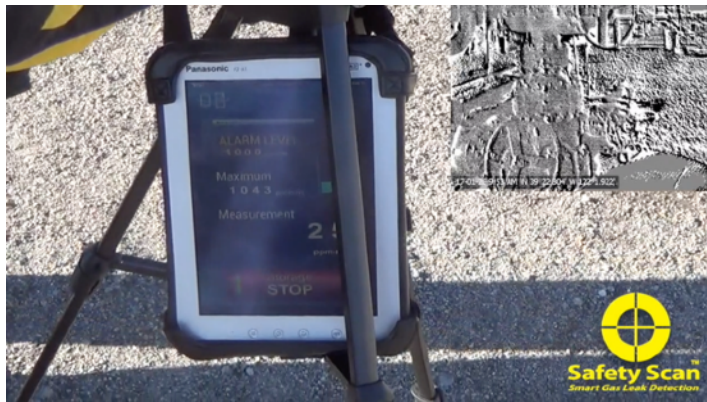
over a 100-year period and 84-87 times more potent over a 20-year period.

Other governmental bodies are following suit. **The State of California**, for example, has enacted legislation (SB1383) requiring business to take measures to help reduce methane emissions by 40 percent the year 2020

Increased monitoring can help meet such challenges, but can be expensive. The cost of adding just one new gas measurement point, including obtaining ‘hot’ work permits, running conduits for wires, burying them, and so on, can be in the neighbourhood of \$10,000 for land-based systems and as much as five times that for offshore applications. **Wireless technology can reduce the cost of adding a monitoring point by up to 90 percent.**

### Benefits

The Vanguard monitor then reduces greenhouse gas emissions by removing cost barriers to increasing the density of monitoring devices. This helps reduce greenhouse gases, first by



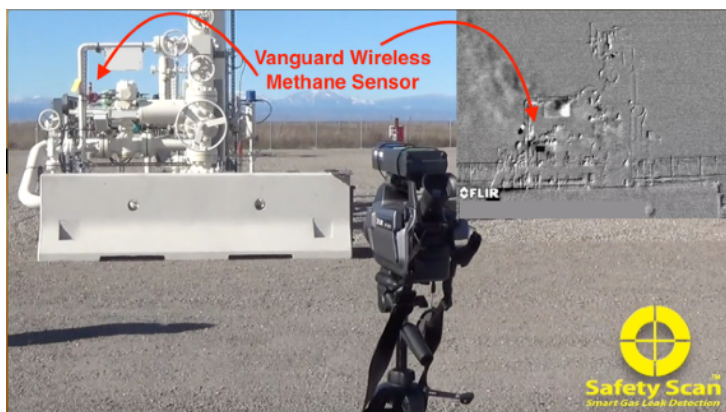
enabling identification of leaks across a much broader area than would be possible with wired devices, and secondly, by monitoring when and whether the leaks have been corrected. This contributes to a cleaner, safer environment for everyone, while at the same time avoiding fines and penalties that might arise from non-compliance.

The Vanguard provides producers with a maintenance benefit as well. By aiding early identification of assets that may be malfunctioning, it helps correct minor equipment performance issues before they become costly or may require total replacement and its unrivalled five-year battery life keeps additional maintenance costs to a minimum.

### Best practices enabled

Mitigation of methane as a greenhouse gas is relatively recent. **California's** many legislations and regulations, that were enacted recently. Best practices for automating monitoring are only now forming. United Electric Controls has been conducting tests that will eventually inform best practices. Using Optical Gas Imaging cameras and LASER Quantification instrumentation provided by **Safety Scan**, we monitor the diffusion of trace amounts of methane from a simulated leak, factor in wind and other environmental conditions, and project the number of sensors that might be required to provide best coverage for an area.

### Contribution to reduction of greenhouse gases



Wireless gas monitoring can contribute to the reduction of greenhouse gases on many fronts. The EPA has identified hundreds of thousands of potential leakage sites in the U.S. alone. These include 365,000 oil wellheads, 100,000 oil storage facilities, 555,000 natural gas wellheads, 400,000 miles of natural gas gathering pipelines, and 300,00 miles of natural gas pipelines. Most of these locations are aging,

increasing the risk of leakage.

Detecting and monitor leaks on so many facilities would not be economically feasible with wired stations. Affordable, easy to use wireless technology could, however, have a significant impact.

### **Safety Scan USA & United Electric Controls are already conducting a monitoring study in a Gas Storage Facility in California**



#### Wellhead Methane Monitoring Case Study:

##### Purpose of Study:

Evaluate the Vanguard self-powered *Wireless* HART Methane Gas detection system for wellhead monitoring. The goal is to look at low level “fugitive emissions” and determine best practices for deployment to provide reliable detection. Part I of this study started

this year and it will continue with ongoing monitoring, the Vanguard Units are on Beta Test and being monitored continually. The Vanguard is moving from the beta phase and go into full sales phase in March of 2017

Want to read the details of this Part 1 ?

<http://safetyscan.org/contact/>

### **Conclusion**

Continuous Monitoring for fixed sources such as Wellheads, crude storage tanks, Compressor stations, regulator stations etc. is preferable to intermittent Monitoring using hand operated technologies (sniffer, hand held Open path radar), as a small leak can develop into a large leak in a short period of time. Handheld leak detection is costly due to high labor costs and is not timely unless deployed on a continuous basis. Traditional NDIR point detection is effective but costly due to high installation costs associated with wired (signal and power)

The best solution is self-powered wireless communicating gas detectors using a robust, open source, self-organizing wireless mesh network such as *WirelessHART*.





The Flir GF 320: Optical Gas Imaging Camera, although is not being pushed by this rulemaking I strongly believe this solution is more cost effective than method 21 due to the speed that we can perform leak inspections in a ratio about 20 to 1 compared to the sniffer and its related cost is way below this ratio. Plus consider the quality of the deliverable that will produce an infrared video image of the gas leaks (or the lack)

with embedded GPS and time and date stamp encrypted into the files to produce due diligence proof of the inspections. This solution replaces paper records according to the new US EPA NSPS Quad-O



Another alternative to mobile methane leak inspections is a pocket size device called: Laser Mini by Pergam Technical Services, a company with a US office in Seattle, WA headquartered in Zurich Switzerland

The Laser Methane mini (SA3C32A) Intrinsically Safe and Laser Methane mini-G (SA3C50A) are laser-type detectors, capable of safely and quickly detecting gas leaks from a distance. The Laser Methane mini-G guarantees best visibility through green laser and

capable to communicate with mobile devices! By linking to an Android device, you can view your recordings as a graph, the measurement history and measured locations on a map. The laser allows inspections in bright outdoor environments to a distance up to 100 ft. And the technology even allow for measurements works through glass and it is very easy to use



Safety Scan used a combination of these 2 technologies to perform its pre assessment engineering services to make sure the Vanguard sensors were installed and positioned correctly on the study referred above on a natural gas underground storage facilities in northern **California**, that it is in progress now

More details ?

<http://safetyscan.org/contact/>



I want to add the inspections for natural gas leaks on the streets of the many California communities, this is a very effective technology that can be mounted on vehicles. Since this solution has options for bumper mounted devices and a roof based equipment that can be used to inspect any natural gas leak source that is close to where people live. The inspection team just have to drive by and point its laser beam using a joystick type remote control

inside the vehicle that together with a computer onboard to record everything with GPS information to produce a very detailed report of the findings. Or just driving by the bumper sensor will detect methane leaks coming from underneath the road that it is driving over

This solution is called SELMA and it is provided by Pergam Technical Services based in Seattle and headquartered in Switzerland. It is important to note that this can be provided as a full solution including hardware, installation and training or as a service only to make it very affordable to natural gas utilities companies. It is important to note that the full solution is less than a third of the price of a solution that is being tested in the California market since last year



**SELMA** – the abbreviation for **Street Evaluating Laser Methane Assessment** – is one of the most advanced diagnostic tools for the detection of methane emissions from leaks or other sources. It detects and documents methane gas in the driving path of the vehicle.



Two independent laser systems monitor the driveway (SELMA MPB – bumper laser) and the sidewalk (SELMA Roof). SELMA MPB and SELMA Roof can operate simultaneously as well as separately. SELMA's main application is leak

detection on natural gas transmission and distributions pipelines, inspections of natural gas storage tanks, compressor stations and other potential sources of methane emissions to the atmosphere.

More details ?

<http://safetyscan.org/contact/>

Thank you for seriously considering the latest available and affordable technologies in the United States to keep our communities safe, to maintain and monitor the quality of our environment and at the same time maintaining a vibrant industry moving forward creating safe jobs and progress in California.

F-6-1

Sincerely,

ELIAS TOBIAS, P. Eng.  
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February 21, 2017

Elizabeth Scheehle, Chief  
Oil and Gas and GHG Mitigation Branch  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

RE: Comments on Proposed 15-Day Modifications

Dear Ms. Scheehle:

The Butte County Air Quality Management District (District) thanks you for the opportunity to comment on the proposed 15-day modifications to the regulation to address Greenhouse Gas emissions from the Oil and Gas industries. We also appreciate the opportunities to provide feedback as these modifications were being developed.

On the proposed regulation posted February 3, 2017, we offer the following comments:

Enforcement and Permitting: As noted in our earlier comments for the ARB Board meeting, the proposed regulation's ISOR has been termed "optional" for Districts to enforce and implement the regulation but we still read Section 95674(b)(1) as mandatory for a permitted source to apply to include the regulation requirements in a local permit and, since no changes were proposed to this section, we are still unclear on what occurs if a district chooses not to implement all portions of the regulation.

F-7-1

Underground Storage Monitoring: As we have previously commented on the Section addressing underground natural gas storage facilities, we are unsure of how the proposed monitoring will be used to determine the "baseline monitoring conditions" (undefined term). The proposed regulation does not indicate that "baseline" is the ambient/upwind concentration, some average or ratio of the downwind and upwind concentrations, or all or a fraction of the downwind concentration. If the "baseline" includes some combination of acceptable fugitive emissions from the facility, it appears that monitoring a higher background without an upper limit would limit the effectiveness of the regulation, i.e. would set higher alarm levels, etc.

F-7-2

Alarm Reporting: The wording on the thresholds and notification requirement in several sections appears awkward. How can a facility report an alarm notice within 24 hours of an initial leak measurement for a 5-day reading above 10,000 ppm? The initial leak measurement would have occurred 4 days prior. Previous sections of the regulations use "alarm" as the event that triggers the notification not the specific thresholds. The regulation notes when the monitoring system must trigger an alarm, so the language could be revised

F-7-3

to: "Any time the monitoring system triggers an alarm, the owner or operator shall confirm the alarm condition has occurred and notify ARB within 24 hours of the alarm."

Several sections of the proposed changes to the Regulation (i.e. Section 95668(h)(5)(B)6.) requires the owner or operator to notify ARB, DOGGR and the air district in case of alarms or other notification events. This is a mandatory requirement for the regulated facilities and the local district may or may not be implementing the program and may not require such notifications. Although the proposed requirement is conservative, it is unnecessary since those districts implementing the regulation are required to write such requirements into the air permit. These notification requirements should have a caveat that allows for districts to opt out of receiving notifications. Suggested language to allow district the option of receiving notifications: "...then notify ARB, DOGGR, and, upon request, the local air district...".

F-7-3  
cont.

The California Department of Conservation Division of Oil, Gas, and Geothermal Resources is used in the regulation sufficient times to warrant inclusion in the definitions with the appropriate acronym (DOGGR).

Consistency: The repair requirement for instrumentation in Section 95668(h)(5)(B)1.e. should include the same phrase as Section 95668(h)(5)(A)1.b. "... 14 calendar days from the date of calibration or the discovery of the malfunction".

F-7-4

Thank you again for the opportunity to comment. We look forward to working with ARB staff on the final regulation. If there are any questions regarding these comments, please contact David Lusk on my staff or me.

Sincerely,



W. James Wagoner  
Air Pollution Control Officer  
Butte County Air Quality Management District

Ann L. Trowbridge  
[atrowbridge@daycartermurphy.com](mailto:atrowbridge@daycartermurphy.com)

February 21, 2017

VIA WEBSITE ([COMMENT SUBMITTAL](#))

Clerk of the Board  
California Air Resources Board  
1001 "I" Street  
Sacramento, CA 95814

Re: Independent Storage Provider Comments Regarding Proposed 15-Day Modifications to Proposed Regulation – Subarticle 3: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities

Dear Chair Nichols and Members of the Board:

The Independent Storage Providers (Central Valley Gas Storage, LLC, Gill Ranch Storage, LLC, Lodi Gas Storage, L.L.C., and Wild Goose Storage, LLC, collectively the "ISPs") appreciate the opportunity to provide these comments regarding the California Air Resources Board's ("CARB") Proposed 15-Day Modifications to the Proposed Regulation, Subarticle 3: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities ("Proposed Regulations"). The ISPs support California's ongoing efforts to reduce Greenhouse Gas ("GHG") emissions. Through these comments, the ISPs seek to ensure that the Proposed Regulations facilitate meaningful GHG emission standards, in an efficient, cost-effective manner.

Following are the ISPs' specific comments.

Section 95667. Definitions

➤ Section 95667(a)(4)

The definition of "blowout" refers broadly to the "uncontrolled flow of gas, liquids or solids (or a mixture thereof) from a well onto the surface." Because a blowout may give rise to other required action or potentially a violation (*see, e.g.* section 95668(h)(5)(B)5.), it is important to have more clarity regarding what would constitute a blowout versus minor instances of uncontrolled flow (*e.g.*, small leaks). The ISPs believe CARB intends the definition of "blowout" to cover situations like the recent incident at the Aliso Canyon facility, but not leaks from above ground well equipment. Accordingly, the ISPs recommend that the definition of "blowout" be modified to clarify that such leaks do not constitute a "blowout", through establishing a leak threshold that results in an event being

F-8-1

classified as a “blowout”, or defining a process for determining a blowout through case-by-case consultation with CARB staff. Alternatively, section 95668(h)(5) could be revised to clarify that the criteria or process for determining a blowout at a particular facility may be set forth in a natural gas underground storage facility monitoring plan.

F-8-1  
cont.

➤ Section 95667(a)(66)

The ISPs appreciate the proposed revisions to the definition of “well”. The revised definition provides greater consistency between CARB definitions and Public Resource Code definitions, which in turn will provide greater certainty to operators who must implement the CARB regulations.

Section 95668. Standards

➤ Section 95668(a) Separator and Tank Systems

Section 95668(a)(2)(B) provides that the requirements of section 95668(a) for separator and tank systems do not apply to systems used in non-associated gas production that receive an average of less than 200 barrels<sup>1</sup> of produced water per day. “Non-associated gas” is “natural gas that is not produced as a byproduct of crude oil production but may or may not be produced with condensate.” (Section 95667(a)(36).) Wells used in gas storage operations are substantially similar to non-associated gas production. During discussions with CARB staff, the ISPs understood that storage water production would be similarly exempt, however that is not how the Proposed Regulations are drafted. In fact, the ISPs cannot find any section 95668(a)(2) exemption that would clearly apply to an ISP produced water tank, unless the tank contains water for 45 days per year or less. The ISPs recommend that CARB clarify that gas storage wells are included in the exemption for non-associated production, by revising section 95668(a)(2)(B) as follows:

F-8-2

Separator and tank systems used in non-associated gas production, including production of non-associated gas from underground natural gas storage, that receive less than 200 barrels of produced water per day.

The ISPs also propose revisions to the data to be used to calculate average daily production, based on natural gas storage reporting. Natural gas storage facilities do not file the annual production certified reports which section 95668(a)(2)(B) currently relies on to establish average daily production. Instead, natural gas storage facilities file quarterly SB 1281 reports with the Division of Oil, Gas, and Geothermal Resources (“DOGGR” or the “Division”). To address this fact, the ISPs propose the following revision to section 95668(a)(2)(B):

F-8-3

The average daily production shall be determined using the annual production certified reports or, for natural gas storage, the SB 1281 quarterly reports submitted to ... .

<sup>1</sup> Alternatively, the definition of “non-associated gas” could be similarly modified.

➤ Section 95668(h) Natural Gas Underground Storage Facility Monitoring Requirements

○ Section 95668(h)(5)(A) should be revised to make clear that one upstream and one downstream monitoring point is the standard for an underground natural gas storage facility. It would be costly and inefficient for facilities with geographically disperse assets, and/or non-contiguous compressor stations, well pads, and other equipment, to install continuous monitoring at each location. Additionally, each storage field is different and, therefore, individual monitoring plans will be tailored to take into account their unique characteristics.

F-8-4

○ The ISPs appreciate the revision to section 95668(h)(5)(A)1.a. to increase the measuring sensitivity of upwind and downwind instruments to a minimum 250 ppb accuracy. However, the ISPs continue to have some concern about the availability of cost-effective, durable, and reliable equipment that will meet even the revised requirement. Accordingly, the ISPs recommend that this requirement be revised to apply when cost-effective, durable, and reliable equipment is available, or that section 95668(h)(2) be revised to provide that the January 1, 2018 monitoring plan submittal deadline is subject to the availability of cost-effective, durable, and reliable equipment capable of achieving the requirements of section 95668(h)(5)(A)1.

F-8-5

○ The ISPs appreciate the revised requirement in section 95668(h)(5)(A)7. to trigger alarms at 4 times baseline; this concept is more realistic than what had appeared in prior versions of the Proposed Regulations. However, because ISP facilities are generally located in rural areas with naturally occurring methane from agricultural sources, development of an understanding of the magnitude of variability in methane levels will occur after monitoring is in place and a baseline is established. Along with adjusting baseline levels to account for local conditions, it may also be necessary to adjust trigger multiples to account for the variability associated with local conditions.

F-8-6

○ Section 95668(h)(5)(B) appears to include requirements for daily or continuous leak screening that substantially overlap the requirements in section 95668(h)(5)(A). As currently drafted, it is unclear what the daily monitoring in subdivision (B) is intended to find. If the purpose is to augment the continuous monitoring required under subdivision (A) with additional screening near the wellheads, then an additional daily monitoring requirement is excessive and unduly burdensome, especially in light of its costs. The ISPs recommend replacing the proposed daily monitoring requirement with a weekly wellhead inspection protocol.

F-8-7

CARB's Revised Cost Estimates for Natural Gas Storage Facility Monitoring Requirements<sup>2</sup> provides a reasonable cost estimate for ambient air monitoring based on the costs that are currently used for existing CARB monitoring stations. This analysis estimates a capital cost of \$350,000 and ongoing costs of \$179,000 per year. Using CARB's Capital Recovery Factor (as revised in the February 17 Errata to the Proposed Regulations), the combined burden on each ISP would be a minimum of \$259,500 per year.

With regard to daily or continuous monitoring, DOGGR prepared a Standardized Regulatory Impact Assessment regarding pending proposed new regulations for underground storage. This Assessment included an estimate of the cost entailed in daily monitoring efforts: "the Division estimates that, on average, each facility will have to hire one to three staff at \$80/hr. for approximately 40 hours per week to conduct daily monitoring."<sup>3</sup>

Even if an ISP needs only one additional staff member to conduct this monitoring, requiring extensive daily monitoring would result in substantial costs for the ISPs (*e.g.*,  $\$80/\text{hr.} \times 40 \text{ hrs./week} \times 52 \text{ weeks/yr.} = \$166,400/\text{yr.}$ ). *Using the same factors but reducing the monitoring frequency to weekly as the ISPs recommend would reduce the cost of well monitoring to \$33,280/yr.* Based on the Division's cost estimates, an ISP would spend more than \$130,000 per year on additional (daily vs. weekly) monitoring labor costs that could more effectively be used for other safety and maintenance related items. If daily monitoring has to be done by Method 21 or Optical Gas Imaging ("OGI") equipment, that will further drive up the expense of this monitoring. The same Assessment shows the cost of an OGI instrument to be \$95,000, and states that "operators will purchase at least one and up to three units per field for this monitoring activity."

Regarding the possibility of meeting the well monitoring requirement using an automated system, as contemplated by CARB in its Revised Cost Estimates, for even the smallest of the ISP facilities, there is no scenario where the estimated costs (including labor costs and annualized capital costs) for operating the equipment would cost less than \$100,000 per year. When the annualized costs for both continuous air monitoring and daily/continuous well monitoring requirements are added, no ISP will be able to comply without incurring annual expenses in excess of \$350,000 per year. Notably, unlike the major transmission and distribution utilities, the ISPs do not have monopoly customer bases and do not charge California Public Utilities Commission ("CPUC")-approved cost-of-

F-8-7  
cont.

<sup>2</sup> CARB, Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information (February 3, 2017), Attachment 2, page 12.

<sup>3</sup> California Department of Conservation, Division of Oil, Gas and Geothermal Resources Underground Gas Storage Regulations Standardized Regulatory Impact Assessment, Direct Costs to California Businesses, Section d, iii, Leak Detection Protocols, p. 24.

service based rates. This means that they are not assured recovery of the costs to implement these new monitoring requirements.

A properly designed continuous air monitoring system should detect any wellhead leak. Taking this fact into account, and to avoid imposing substantial costs without corresponding benefits, the ISPs propose that section 95668(h)(5)(B) be modified to call for weekly wellhead inspections with portable leak detection equipment, instead of daily monitoring.

F-8-7  
cont.

- The use of the term “leak” in section 95668(h)(5)(B)3. is unclear. For example, there is no detection level specified for determining when a leak must be measured using EPA Reference Method 21 within 24 hours of detection. The ISPs recommend that CARB revise section 95668(h)(5)(B)3. as follows, to provide further guidance:

F-8-8

All leaks with measured total hydrocarbon concentrations above the threshold concentrations specified in section 95669 of this subarticle identified during daily leak screening...

➤ Section 95669 Leak Detection and Repair

- As discussed in the ISPs’ July 15, 2016 comments (at page 3), the requirements in this section appear duplicative and burdensome considering the extensive monitoring required under section 95668 of the Proposed Regulations. The ISPs reiterate that their facilities are de minimus sources of statewide GHG emissions. In fact, emissions reported to the CPUC for 2015 demonstrate that ISP emissions are less than one-half of one percent of gas utility methane emissions in California, and less than three-hundredths of one percent of all methane emissions in the state.<sup>4</sup> Through the design of their facilities and implementation of various operating measures, the ISPs already are taking action to limit GHG emissions. It is not clear how imposing duplicative, costly, and burdensome leak detection and repair requirements on storage facilities would further California’s GHG reduction goals. Given other applicable monitoring requirements, and the de minimus nature of ISP GHG emissions, the ISPs request that CARB revise section 95669 to provide that the additional leak screening contemplated in sections (e) and (g) does not apply to underground natural gas storage facilities subject to monitoring pursuant to section 95668(h)(5).

F-8-9

- Section 95669(o)(5) provides that “[e]xcept for the fourth (“4<sup>th</sup>”) quarterly inspection of each calendar year, leaks discovered during an operator conducted inspection shall not constitute a violation if the leaking components are repaired

F-8-10

<sup>4</sup> Comments of the ISPs Regarding Administrative Law Judge’s Ruling Entering California Air Resources Board and California Public Utilities Commission Joint Staff Annual Report on Analysis of June 17, 2016 Utilities’ Reports and Commission Staff Proposal on Best Practices Into the Record and Seeking Comments (R.15-01-008), p. 3.

within the timeframes specified in this subarticle.” No explanation is provided as to why leaks discovered during the 4<sup>th</sup> quarterly inspection constitute “automatic” violations, apparently regardless of whether they are repaired within the timeframes specified in Section 95669, while leaks discovered during other times of the year are not “automatic” violations. Notwithstanding the ISPs’ general comment above regarding Section 95669, the ISPs recommend that CARB rectify this discrepancy by eliminating the “automatic” violation for leaks that are discovered in the 4<sup>th</sup> quarter and repaired within applicable timeframes.

F-8-10  
cont.

The ISPs appreciate CARB’s consideration of these comments, and respectfully request that the recommendations set forth herein be adopted.

Sincerely,



Ann L. Trowbridge  
Attorney for Gill Ranch Storage, LLC

cc: John Boehme, Central Valley Gas Storage, LLC  
Lawna Hurl, Senior Legal Counsel, Lodi Gas Storage, L.L.C.  
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February 21, 2017

Joe Fischer  
Project Lead, Oil & Gas Regulation  
California Air Resources Board  
1001 I Street – P.O. Box 2815  
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Re: SoCalGas and SDG&E Comments on the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities Proposed 15-Day Modifications

Dear Mr. Fischer,

Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E) appreciate the opportunity to review and submit comments on the California Air Resources Board's (ARB) Proposed 15-Day Modifications to the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities.

We would like to thank staff for working with stakeholders throughout the rulemaking process. This Proposed 15-Day version incorporates most of the feedback that SoCalGas and SDG&E have provided, and reflects the hard work that staff have put into the rule since 2014. In this letter we provide feedback on remaining rule items that have not yet been addressed in this version.

### **1. Enforcement Provisions Should Be Clarified to Achieve Regulatory Objectives and Incentivize GHG Reduction Efforts**

SoCalGas and SDG&E strongly support ARB's objective to establish a comprehensive program of regulatory and market mechanisms to achieve real, cost-effective, and quantifiable GHG reductions and acknowledge that enforcement provisions are an essential element of an effective regulatory program. In order for enforcement provisions to achieve regulatory objectives in a cost effective manner and incent the desired behavior, it is critical that the enforcement provisions take into account the efforts of regulated entities to comply and do not penalize entities for activities that could not reasonably have been prevented.

Section 95674(a)(1) of the Proposed Regulation provides that "[a]ny penalties secured by a local air district as the result of an enforcement action that it undertakes to enforce the

F-9-1

provisions of this subarticle may be retained by the local air district.” This clause passes up on an opportunity to invest penalties toward further GHG reductions. Moreover, Section 95674(a)(1) creates an incentive for local air districts to strictly construe the regulations, find noncompliance, and seek penalties, even where extenuating circumstances may exist (*e.g.*, leak detection technology malfunction). SoCalGas and SDG&E encourage ARB to remove this provision to avoid creating this incentive and develop a regulatory framework that invests penalties toward greater GHG reductions. As an alternative, if ARB declines to remove Section 95675(c) from the Proposed Regulation, SoCalGas and SDG&E recommend the insertion of a clause to encourage regulated entities to offset excess emissions, to further the objective to reduce GHG emissions, as follows:

§ 95675. Enforcement. ... (c) Each metric ton of methane emitted in violation of this subarticle constitutes a single, separate, violation of this subarticle **unless such metric ton or its carbon dioxide equivalent is fully offset (for example but without limitation, via the surrender of Cap-and-Trade Program compliance instruments to ARB).**

F-9-1  
cont.

In addition, SoCalGas and SDG&E urge ARB to clarify that Section 95675(f) requires intentional conduct and does not impose strict liability for inadvertent errors. Section 95675(f) of the Proposed Regulation provides that “Submitting or producing inaccurate information required by this subarticle shall be a violation of this subarticle.” The operation of such an enforcement provision, if read literally and without consideration of intent or willfulness, would be excessively harsh as inaccurate information may reasonably be “produced” by currently-available monitoring technologies. Indeed, emission reports are generally prepared and submitted using spreadsheet programs that sometimes round off entries by default. It is also possible inaccurate information inadvertently could be “submitted” in good faith to ARB or local air districts implementing the Proposed Regulation. Moreover, the first clause in Section 95675(g) covers falsification of information, so subsection (f) is unnecessary. Accordingly, SoCalGas and SDG&E recommend deletion of Section 95675(f).

F-9-2

As an alternative, if ARB declines to remove Section 95675(f) from the regulations, then SoCalGas and SDG&E recommend that ARB clarify that the regulation is directed at knowing or intentional conduct:

§ 95675. Enforcement. ... (f) **Knowingly** submitting or producing inaccurate information required by this subarticle shall be a violation of this subarticle.

For both our primary recommendation (deleting Section 95675(f)) and alternative recommendation (inserting knowledge qualifier into Section 95675(f)), the second clause of subsection (g) (“or submitting or producing inaccurate information”) should be deleted as it is duplicative.

Finally, in furtherance of ARB’s cost-effective GHG reduction objectives, the Proposed Regulation should be revised to provide a reasonable opportunity to cure the production or submission of inaccurate information before enforcement authority is activated.

## 2. Compliance with Leak Detection and Repair Requirements Makes Unsubstantiated Quarterly Distinction

In general, the Proposed 15-Day version's edits to Section 95669(o) better incentivize operators to locate and repair leaks by providing a limited safe harbor from enforcement for self-discovered leaks. We appreciate ARB's willingness to work with stakeholders to address this important incentive structure. However, Section 95669(o)(5) would exclude from this safe harbor leaks discovered during the 4<sup>th</sup> Quarter of each calendar year. As such, leaks discovered during the last three months of a year would be treated in a radically different way than leaks discovered during the first nine months of a year, with leaks discovered in October – December constituting violations.

This temporal distinction is nonsensical, is inconsistent with the objective of LDAR programs, and there is no rational basis in the administrative record supporting it. LDAR requires periodic leak surveys because leaks in pressurized systems will occur *periodically* regardless of calendar quarter or operator diligence (e.g., due to thermal cycling, vibration, etc. associated with typical operations of the affected components). If finalized, the Proposed 15-Day version's edits to Section 95669(o)(5) would undercut ARB Staff's expressed intent for the Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities Oil: "This modification was necessary to provide operators with the ability to find and repair leaks throughout the calendar year without a penalty which is consistent with the intent of the proposed regulation."<sup>1</sup>

Further, we recommend clarifying that leaks discovered during an Air District inspection similarly enjoy the limited safe harbor. Accordingly, we recommend the revision of Section 95669(o)(5) as follows:

- (5) ~~Except for the fourth (4th) quarterly inspection of each calendar year, leaks~~ Leaks discovered during an operator or Air District conducted inspection shall not constitute a violation if the leaking components are repaired within the timeframes specified in this subarticle.

## 3. Method 21 Concentration-Based Rule Provisions Are Not Supported

As discussed in our previously submitted comments, annual surveys using a Method 21 gas leak concentration measurement (i.e., screening value) of 10,000 ppmv or more as a leak definition would result in emission reductions commensurate with or greater than the assumptions used by ARB that are the basis for the proposed rule.

EPA Method 21 gas leak concentration measurements (i.e., screening values) have a very large uncertainty, are extremely poor predictors of gas leak *rates*, define a minimum leak definition concentration of 4,000 ppmv for many detectors, and should not be the basis for leak repair thresholds and schedules, and rule compliance determinations. The Proposed

<sup>1</sup> ARB, Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information – Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities, at 18 (February 3, 2017).

Rule's LDAR provision should consider (1) the limitations of Method 21 and (2) that over 98% of gas leak mass emissions are from leaks from components with Method 21 screening values greater than 10,000 ppmv. ARB should adopt a leak definition of Method 21 gas leak concentration measurement of 10,000 ppmv and remove Method 21 measured concentration-based rule requirements [e.g., §95669(h), (i), and (o)].

F-9-4  
cont.

Further, the ARB report "Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities" posted to the rule docket provides additional documentation to support the above assertions<sup>2</sup>. The ARB study results are presented graphically in Figure 2-7 of the report, and correlation equations are provided that allow calculation of leak emission rate estimates for different component types based on the EPA Method 21 screening value (SV) measured. In §95669(h) and (i), the ARB proposed rule includes LDAR criteria and repair actions based on Method 21 concentration screening values of 1,000 ppmv, 10,000 ppmv, or 50,000 ppmv. Summary observations regarding the estimated leak emissions rates from the ARB report follow. A more detailed analysis is provided in Attachment A.

- An average component leak with a SV of 1,000 ppmv leaks a negligible amount of gas, less than 1 (one) scf of natural gas per year with a value of less than one cent per year (assuming a gas price of \$3.44 per MCF).
- An average component leak with a SV of 10,000 ppmv leaks less than 20 scf of per year with a value of less than 10 cents per year. The average mass emissions rate for 10,000 ppm leaks is less than 0.03 metric tons CO<sub>2</sub>e per year<sup>3</sup>. ARB has not justified why leaks of this magnitude or smaller warrant regulatory control.
- An average component leak with a SV of 50,000 ppmv leaks about 200 scf of natural gas per year (or about 0.3 metric tons CO<sub>2</sub>e per year) with a value of less than \$1.00 per year. This relatively low emission rate is significant because the proposed rule requires aggressive action for leaks with a SV above 50,000 ppmv and requires such leaks to be eliminated after 2020. As discussed in previous SoCalGas comments, the Method 21 screening value is not indicative of a very large leak, and the proposed measures associated with 50,000 ppmv leaks are not warranted.
- These very small emission rates demonstrate that rule provisions that require leak repairs in a short prescribed time period [e.g., 2 or 5 calendar days in §95669(i)] cannot be cost-effective if the repair cannot be completed immediately (i.e., successful immediate repair is not possible). Daily leak emissions are negligible (e.g., about 1 gram per day for a 10,000 ppm leak) and do not justify the labor cost for an operator to repair such leaks outside their normal maintenance schedule. As discussed in Attachment A, if repairing the leak within the prescribed time includes actions such as additional vehicle trips (e.g., for parts or special services) or de-pressuring the system, the associated emissions will exceed the leak repair reduction in many cases.

F-9-5

<sup>2</sup> "Enhanced Inspection & Maintenance for GHG and VOCs at Upstream Facilities," SAGE Environmental Consulting, December 2016

<sup>3</sup> CO<sub>2</sub>e emissions based on global warming potential of 72.

This information supports previous SoCalGas comments recommending a leak concentration threshold of 10,000 ppm (rather than lower values), and identifying the inability to equate a leak that screens at 50,000 ppm as an especially large emitter.

F-9-5  
cont.

#### 4. 2020 LDAR Requirement Are Not Achievable

SoCalGas and SDG&E remain very concerned with the allowable leak thresholds set for 2020 and beyond and believe that it is not practical or meaningful to prescribe the proposed 2020 leak thresholds, nor achievable to reach such levels. As we explain above, a high concentration measurement does not always correlate to a high-emission leak and there is a strong likelihood that low-emission but high concentration leaks could trigger violations.

We recommend that ARB allow time to evaluate collected data from the LDAR program to assess program efficacy before committing to the limits set beginning January 2020 (Tables 3 and 4). Further, as explained in the Proposed Regulation Staff Report, the allowable number of leaks in Tables 1 and 2 were modeled after existing local air district regulations, which also allowed quarterly inspections to be reduced to annual inspections if a facility maintained compliance for five consecutive quarters<sup>4</sup>. As the revised rule no longer allows quarterly inspections to be reduced to annual, the allowable number of leaks are not appropriate and should be removed.

F-9-6

Accordingly, we recommend the removal of the 2020 allowable number of leaks and repair time periods, and the revision of section 95669(i) as follows:

- (i) On or after January 1, 2020, **ARB will evaluate the reported leak data to determine if the thresholds and associated repair time periods should be adjusted.**

#### 5. ARB Should Consider Safety Concerns with Vapor Collection

Section 95668(d)(4)(C) provides an option for rule compliance for reciprocating compressors, and requires that gas emissions from compressor vent stacks used to vent rod packing or seal emissions be controlled with the use of a vapor collection system as specified in section 95668(c). This option is not always viable from a safety standpoint, and, therefore, the rule should be revised to consider the operational requirements of available external combustion equipment used to control emissions. This control requirement would be the only viable option for compressors where the captured emissions have the potential for entrained air (e.g., from a reciprocating compressor discharge piece into which rod packing vents) and cannot be compressed into an existing sales gas or fuel gas system due to safety considerations.

F-9-7

As previously discussed with staff, a delay of repair provision should be added to §95671(f)(1)(b) to allow time to address technical and safety issues or to obtain permits. We recommend the addition as follows:

F-9-8

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<sup>4</sup> ARB Staff Report: Initial Statement of Reasons. May 31, 2016.

**§95671(f)(1)(b) A delay of repair shall be granted by the ARB Executive Officer if the owner or operator can provide proof that the parts or equipment required to make necessary repairs have been ordered.**

**i. A delay of repair to obtain parts or equipment shall not exceed 30 calendar days, or 60 days from the date from of the initial measurement, unless the owner or operator notifies the ARB Executive Officer to report the delay and provides an estimated time by which the repairs will be completed.**

F-9-8  
cont.

## **6. Rule Should Provide Flexibility for Storage Monitoring Plans**

The natural gas underground storage facility monitoring requirements entail multiple layers of redundancy: 1) continuous ambient monitoring; 2) daily or continuous wellhead monitoring; 3) quarterly LDAR; and 4) daily audio-visual inspection under LDAR. As explained in our previous comment letter, ARB must consider how the high costs of implementing these redundant measures would not provide any meaningful emissions reduction benefits, nor even prevent a large leak<sup>5</sup>. In addition, the Division of Oil, Gas, & Geothermal Resources (DOGGR) has proposed regulations that already require real-time well pressure monitoring for each wellhead<sup>6</sup>, which would detect operating anomalies that trigger investigation before a major leak occurs.

SoCalGas and SDG&E also recommend that the plan allow for more flexibility to allow operators to use technology and processes best suited to the unique characteristics of a storage field location, such as size, terrain, etc. This is consistent with previous staff comments on avoiding an overly prescriptive regulation, and allowing operators to design a plan that meets regulatory objectives.

We provide the following specific comments on the revised monitoring requirements:

**A. Monitor specifications should be flexible.** ARB has added specific requirements for upwind and downwind sensors at storage facilities. While SB 887 language requires monitoring “at sufficient locations” throughout the facility, it does not specify anything further. We, therefore, recommend that the rule allow flexibility for the operator to determine the configuration of the monitoring system, as part of the plan submittal.

- §95668(h)(5)(A): Measurements by the upwind monitor are not considered for the alarm system referenced in §95668(h)(5)(A)7 and the measurements have no utility. ARB does not justify the need for the upwind monitors, and they are an unsupported and unwarranted expense and should be removed from the rule.

F-9-9

<sup>5</sup> SoCalGas and SDG&E Comments on Proposed Regulation, filed July 18, 2016.

<sup>6</sup> [DOGGR Draft Regulations](#) section 1726.7 (a)

- If the requirement is retained, monitoring should be limited to one upwind and one downwind monitor, as reflected in ARB's cost estimates. ARB Attachment 2 analysis assumes two ambient monitoring stations for each facility. The continuous air monitoring requirements in the proposed rule are ambiguous. The rule text should reflect ARB's associated support analysis, and codify this monitoring approach:

"Continuous air monitoring to measure upwind and downwind ambient concentrations of methane at sufficient locations throughout the facility to identify methane emissions in the atmosphere."

F-9-9  
cont.

1. The monitoring system must have at least one sensor located in a predominant upwind location and at least one sensor located in a predominant downwind location with the ability to continuously record measurements."

- The 250 ppb accuracy requirement for ambient monitors is ambiguous and requires a measurement concentration or range to provide context. In addition, since methane monitoring technology continues to be developed, the proposed requirement could exclude viable technologies. Additional flexibility is warranted, and the accuracy requirement should be reflected as a relative accuracy rather than absolute accuracy. The following context is based on the average ambient methane concentration in California, which is about 2 ppmv, and includes flexibility for new technologies that may become available. We propose the following changes:

F-9-10

§95668(h)(5)(A)1.a: "The upwind and downwind instruments shall have the capability to measure ambient concentrations of 2 ppmv methane within minimum 250 ppb accuracy to determine upwind and downwind emissions baselines, or other performance criteria approved by the ARB Executive Officer."

- B. Alarm system requirements should be revised.** Section 95668(h)(5)(B) requires notification to regulatory agencies any time a leak above 50,000 ppmv is identified or above 10,000 ppmv is identified for more than five continuous days. Leak rate / Method 21 concentration correlations from ARB's recently released Enhanced I&M Report (discussed above and in Attachment A) indicate that:

- Average 10,000 ppmv leaks from connectors, flanges, and valves in natural gas service emit less than 0.2 pound of methane per year (or less than 0.25 gram per day), and
- Average 50,000 ppmv leaks from connectors, flanges, and valves in natural gas service emit about 1 to 2 pounds of methane per year (or about 1 to 2 grams per day).

F-9-11

ARB has not justified why such small leaks warrant regulatory notification. Further, as noted above, an alarm is required if instrumentation detects "a leak" above 10,000 ppmv for more than 5 continuous days. Then, §95668(h)(5)(B)(6) requires notification to state and local agencies if a leak is identified based on a subsequent Method 21 survey. As discussed in the previous item, and discussed further below and presented in Attachment A, Table 2, leaks can be very small at this concentration level and notifications may not be warranted.

Implementation is also not clear – e.g., it is not clear if a single instantaneous measurement above 10,000 ppmv once per day for 6 days would result in the conclusion that the, “10,000 ppmv leak persists for more than 5 continuous calendar days.” SoCalGas recommends a revision to the response required if continuous instrumentation persistently detects a leak larger than 10,000 ppmv. If the leak is investigated and repaired per §95668(h)(5)(B)(3) and (4), and recorded and reported per §95668(h)(5)(B)(7) and (8), notifications should not be required. Based on the leak rates noted in Attachment A, Table 2 (e.g., ARB report correlation equations show average emission rates of 0.2 to 2 grams per day), notifications to several state and local agencies are not warranted.

F-9-12

- C. More time is needed for revisions of monitoring plan.** We appreciate that ARB allows 180 days for operators to implement monitoring plans after approval, as we had requested. However, the rule still only provides 14 days for revisions if ARB disapproves the operator plan. 14 days is not sufficient time to revise a storage facility monitoring plan, particularly when it is considered these will be the initial plans and that ARB will be approving or disproving the plans just prior to the July 4<sup>th</sup> holiday. A minimum 60-day time period is needed. We provide the following edits:

F-9-13

§95668(h)(3)(A): “Revisions to monitoring plans must be submitted to ARB within ~~14~~ **60** calendar days of ARB notification”

§95668(h)(3)(B) “ARB will approve in full or in part, or disapprove in full or in part, the revisions to the monitoring plan within 14 calendar days of submittal to ARB. **If ARB does not respond with the 14 calendar days the monitoring plan is approved in full.**”

- D. Well blowout -** Assuming ARB retains Section 95675(c), we recommend that a well blowout not be considered a violation and that new Section 95668 (i)(5)(B)(5) be deleted in its entirety. In that scenario, the rule would fully cover the climate impact of a well blowout and operators would be fully incentivized to avoid well blowouts.

F-9-14

SoCalGas and SDG&E would like to thank ARB staff for considering our feedback. Please contact me if you have any questions or concerns about these comments.

Sincerely,

/s/ Tim Carmichael

Tim Carmichael  
Agency Relations Manager  
SoCalGas and SDG&E



## **Attachment A: ARB's Enhanced I&M Report data supporting SoCalGas comments, including additional examples and analysis**

On February 3, 2017, ARB released a report prepared by Sage Environmental, "Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised)." As discussed in the comments and further explained below, the ARB report supports previous SoCalGas comments questioning the leak definition (i.e., based on an EPA Method 21 screening value (SV) of 1,000 ppmv versus 10,000 ppmv) and related requirements for repair schedules and other criteria associated with those two screening values and a SV of 50,000 ppmv.

The report presents results from an ARB field study that measured mass emissions from leaking components in natural gas service, and correlated emission rates with EPA Method 21 screening values (SVs). This is consistent with historical studies that have developed "correlation equations" for leaks where the estimated leak rate is a function of the Method 21 screening value.

In previous comments, SoCalGas has provided examples of very low mass emissions associated with some leaks, and the ARB Enhanced I&M Report provides additional documentation to support those assertions. The ARB study results are presented graphically in Figure 2-7 of the report, and correlation equations are provided that allow emission rate calculations for different component types.

Emission rates can be calculated using the correlation equations and analysis can consider associated proposed rule benefits based on those results. For example, in §§95669(h) and (i), the ARB proposed rule includes LDAR criteria and repair actions based on SVs of 1,000 ppmv, 10,000 ppmv, or 50,000 ppmv. The associated emission rates can be calculated and implications assessed.

### Overview of Emission Levels based on ARB Enhanced I&M Report Screening Value Correlations

Tables 1 through 3 present calculated hourly or annual emission rates for key proposed rule SV thresholds. The value of the gas saved presented in the tables is based on a natural gas price of \$3.44 per MCF<sup>1</sup>.

- An average component leak with a SV of 1,000 ppmv leaks a negligible amount of gas, less than 1 (one) scf of natural gas per year with a value of less than one cent per year.
- An average component leak with a SV of 10,000 ppmv leaks less than 20 scf of natural gas per year with a value of less than 10 cents per year. The average mass emissions rate for 10,000 ppm leaks is less than 0.03 metric tons CO<sub>2e</sub> per year. ARB has not justified why leaks of this magnitude or smaller warrant regulatory control.
- An average component leak with a SV of 50,000 ppmv leaks about 200 scf natural gas of per year with a value from saved gas of less than \$1.00 per year. This relatively low emission rate is significant because the proposed rule requires aggressive action for leaks with an SV above 50,000 ppmv and requires such leaks to be eliminated after 2020. As discussed in previous SoCalGas comments and demonstrated in Table 3, the Method 21 screening value is not necessarily indicative of a very large leak, and the measures associated with 50,000 ppmv leaks are not warranted.
- These very small emission rates demonstrate that rule provisions that require leak repairs in a short prescribed time period [e.g., 2 or 5 calendar days in §95669(i)] cannot be cost-effective if the repair cannot be completed immediately (i.e., successful immediate repair is not possible). Daily leak emissions are negligible (e.g., about 1 gram per day for a 10,000 ppm leak) and do not justify the labor cost for an operator to repair such leaks outside their normal maintenance schedule.

For example, the incremental emissions associated with repairing a 10,000 ppmv leak after 30 days rather than 5 days is about 4 lbs (or 0.002 metric tons) of CO<sub>2e</sub> (based on a GWP of 72). If an operator was required to make a designated trip to repair the leak to meet a 5 day repair time period,

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<sup>1</sup> \$3.44 per MCF is the natural gas value used by ARB in its economic analysis.

and the repair required one hour at \$60/hr, the cost-effectiveness associated with the incremental leak reduction would be about \$30,000 per metric ton. Further, and as discussed below and shown in Figure 1, a light duty truck emits about one pound of CO<sub>2</sub> per mile. Thus, if the designated trip to repair the leak to meet the 5 day repair time period required more than 4 miles of driving, rule compliance would cause a net increase in GHG emissions.

Tables 1 – 3 present average leak emission rates based on correlation equations from the ARB study. Averages are based on the emission rates for the four component types. Weighted averages presented in the tables consider the number of each type of component included in the study. That last column in each tables presents the value of gas saved based on a natural gas price of \$3.44 per MCF.

**Table 1. Average Leak Rate Emissions, Method 21 Screening Value = 1,000.**

Component	TOC (as CH <sub>4</sub> ) Leak Rate for M21 Screening Value of 1,000 ppmv							
	kg/hr	gram/day	lb CO <sub>2</sub> e/day	lb/yr	mt CO <sub>2</sub> e/yr	scf/hr	scf/yr	\$/yr
Valves	4.6E-7	1.1E-2	1.7E-3	8.9E-3	2.9E-4	2.4E-5	0.21	\$0.001
Connectors & Flanges	9.7E-7	2.3E-2	3.7E-3	1.9E-2	6.1E-4	5.0E-5	0.44	\$0.002
OELs	3.0E-6	7.1E-2	1.1E-2	5.7E-2	1.9E-3	1.5E-4	1.35	\$0.005
Other components	1.2E-6	2.8E-2	4.4E-3	2.3E-2	7.4E-4	6.1E-5	0.53	\$0.002
<b>Average</b>	<b>1.4E-6</b>	<b>3.3E-2</b>	<b>5.3E-3</b>	<b>2.7E-2</b>	<b>8.8E-4</b>	<b>7.2E-5</b>	<b>0.63</b>	<b>\$0.00</b>
<b>Weighted Average</b>	<b>1.3E-6</b>	<b>3.2E-2</b>	<b>5.1E-3</b>	<b>2.6E-2</b>	<b>8.4E-4</b>	<b>6.9E-5</b>	<b>0.61</b>	<b>\$0.00</b>

**Table 2. Average Leak Rate Emissions, Method 21 Screening Value = 10,000.**

Component	TOC (as CH <sub>4</sub> ) Leak Rate for M21 Screening Value of 10,000 ppmv							
	kg/hr	gram/day	lb CO <sub>2</sub> e/day	lb/yr	mt CO <sub>2</sub> e/yr	scf/hr	scf/yr	\$/yr
Valves	9.9E-6	0.24	0.04	0.19	0.006	5.1E-4	4.50	\$0.02
Connectors & Flanges	7.7E-6	0.18	0.03	0.15	0.005	4.0E-4	3.50	\$0.01
OELs	8.0E-5	1.93	0.31	1.55	0.051	4.2E-3	36.70	\$0.13
Other components	6.6E-5	1.59	0.25	1.28	0.042	3.5E-3	30.30	\$0.10
<b>Average</b>	<b>4.1E-5</b>	<b>0.99</b>	<b>0.16</b>	<b>0.79</b>	<b>0.026</b>	<b>2.1E-3</b>	<b>18.75</b>	<b>\$0.06</b>
<b>Weighted Average</b>	<b>3.6E-5</b>	<b>0.86</b>	<b>0.14</b>	<b>0.70</b>	<b>0.023</b>	<b>1.9E-3</b>	<b>16.46</b>	<b>\$0.06</b>

**Table 3. Average Leak Rate Emissions, Method 21 Screening Value = 50,000.**

Component	TOC (as CH <sub>4</sub> ) Leak Rate for M21 Screening Value of 50,000 ppmv							
	kg/hr	gram/day	lb CO <sub>2</sub> e/day	lb/yr	mt CO <sub>2</sub> e/yr	scf/hr	scf/yr	\$/yr
Valves	8.4E-5	2.02	0.32	1.62	0.05	4.4E-3	38	\$0.13
Connectors & Flanges	3.3E-5	0.78	0.12	0.63	0.02	1.7E-3	15	\$0.05
OELs	8.1E-4	19.35	3.07	15.57	0.51	4.2E-2	368	\$1.27
Other components	1.1E-3	26.81	4.26	21.58	0.70	5.8E-2	510	\$1.76
<b>Average</b>	<b>5.1E-4</b>	<b>12.24</b>	<b>1.94</b>	<b>9.85</b>	<b>0.32</b>	<b>2.7E-2</b>	<b>233</b>	<b>\$0.80</b>
<b>Weighted Average</b>	<b>4.4E-4</b>	<b>10.51</b>	<b>1.67</b>	<b>8.46</b>	<b>0.28</b>	<b>2.3E-2</b>	<b>200</b>	<b>\$0.69</b>

Related Analysis and Comments: Emission rates and proposed storage monitoring and LDAR criteria

- Screening Value-based Notification Criteria in §95668(h)(5)(B): This section requires notification to regulatory agencies any time a leak above 50,000 ppmv is identified or above 10,000 ppmv is identified for more than five continuous days. Leak rate / Method 21 concentration correlations from ARB's recently released Enhanced I&M Report (discussed further below) indicate that:
  - Average 10,000 ppmv leaks from connectors, flanges, and valves in natural gas service emit less than 0.2 pound of methane per year (or less than 0.25 gram per day), and
  - Average 50,000 ppmv leaks from connectors, flanges, and valves in natural gas service emit about 1 to 2 pounds of methane per year (or about 1 to 2 grams per day).

F-9-15

ARB has not justified why such small leaks warrant regulatory notification.

- Emissions Implications from Repair Schedules in §§95669(h) and (i): These two sections define repair schedules based on SVs. SoCalGas recommends revisions to allow more appropriate repair schedules. For example, GHG emissions from driving to repair leaks may be *higher* than the emissions that are reduced if unscheduled trips are required.

Example scenarios are provided to compare and contrast emissions from actions that would result from proposed rule requirements. For example, the cited rule sections list schedules for repairing leaks based on the SV, and leaks must be successfully repaired or removed from service within as little as 2 calendar days of initial leak detection. In some cases (e.g., when a first attempt at repair is not possible or not successful), this may require an expedited response including personnel working weekends and holidays. It does not appear that ARB has considered the GHG emissions caused by such an expedited response, the associated environmental benefit (or dis-benefit), or the cost-effectiveness of such an expedited response.

F-9-16

The following examples illustrate potential emissions reductions from leak repair and related emission increases from vehicle travel if unplanned trips are required. The emissions dis-benefit discussed below can be further compounded if equipment de-pressurization is required to safely perform the repair. That analysis is not presented here, but could be completed to demonstrate additional emission dis-benefits from prescribed repair schedules that do not consider operational and logistical factors. Emission rates from correlation equations in ARB's Enhanced I&M Report can be used to assess and compare emission levels from the leak and from vehicle travel:

- GHG emissions from additional driving caused by an expedited response can exceed incremental GHG emission reductions. Figure 1 shows cumulative GHG emissions (as CO<sub>2</sub>e, GWP = 72 for methane) for two average leak rates for **50,000** ppm leaks (leak concentration as methane measured by EPA Method 21). Such leaks will be rare, and leak rates (and emissions reductions) will typically be *much lower* than presented in Figure 1. The 2 grams methane per day leak rate applies to connectors, flanges, and valves, and the 25 grams methane per day leak rate applies to OELs and other components (refer to ARB's Enhanced DI&M Report and Table 3 above). Light duty trucks emit about 1 pound of CO<sub>2</sub> per mile<sup>2</sup>.
  - In Figure 1, the red line estimates the CO<sub>2</sub> emissions if an employee drove 40 miles (roundtrip) to repair a leak. For example if they had to work on a weekend and make a special trip to repair the component, or if an unplanned trip was required to meet the repair schedule. The vehicle emissions would exceed the GHG emissions for 10 days of gas leakage at 25 grams of methane per day and *months* of GHG emissions for gas leakage at 2 grams of methane per day. The employees may drive further than 20 miles (one way) to address the required leak repair schedule.

<sup>2</sup> Based on CO<sub>2</sub> emissions from motor gasoline combustion of 20 pounds per gallon, with the truck averaging about 20 mpg.

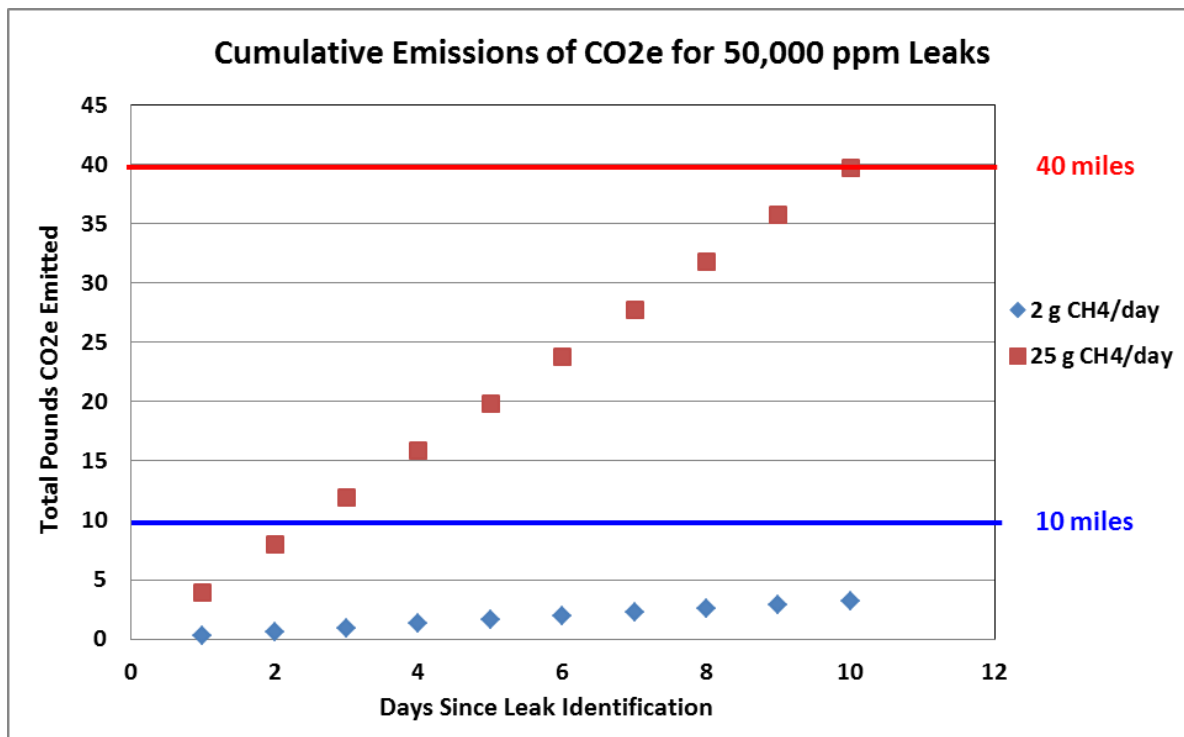
- In Figure 1, the blue line estimates the CO<sub>2</sub> emissions if an employee drove 10 miles (roundtrip) to repair a leak, for example if they had to make a special trip within a large gas storage facility to repair the component. This would equal the GHG emissions for about 3 days of gas leakage at 25 grams of methane per day and about 25 days of GHG emissions for gas leakage at 2 grams of methane per day.

The leak repair reductions are further offset by vehicle methane emissions, which are not presented in Figure 1. For example, based on an EPA report,<sup>3</sup> gasoline fueled trucks emit 0.02 to 0.05 grams of methane per mile. For a 10 miles trip, this is 0.2 to 0.5 grams of methane emissions (versus a very conservatively high leak rate of 2 or 25 grams per day shown in Figure 1). For a 40 mile trip, this equates to 0.8 to 2.0 grams of methane emissions – or a similar magnitude as the daily leak rate.

The approximate cost-effectiveness (i.e., \$ / metric ton of incremental CO<sub>2</sub>e emission reductions) can also be considered, independent of the emissions dis-benefit discussed above. The cost for an expedited leak repair is well above \$10,000/metric ton, which is a very high value for GHGs. For example, personnel working two hours on a weekend or over-time at a fully burdened cost of \$60/hr to specifically repair a 2 gram methane per day leak (e.g., to meet a 2 calendar repair time schedule), that could have been repaired during a normal rounds ten days later, would cost about \$100,000 per incremental metric ton CO<sub>2</sub>e emission reductions.

In sum, repair time periods should be of sufficient duration that repairs can be conducted during a normal and organized repair schedule that would not require unnecessary site visits (i.e., driving) that will result in excess GHG emissions, as well as to avoid extremely disproportionate costs relative to the incremental emission reductions. The rule should allow a minimum of 10 business days. If equipment venting is required to complete the repair, then the repair schedule should allow additional time, as warranted. Repair at the next scheduled process shutdown may be appropriate.

F-9-16  
cont.



**Figure 1. Compare cumulative CO<sub>2</sub>e emissions by day (for average 50,000 ppm leaks) to emissions from vehicles mileage to address leak repair. Methane GWP = 72.**

<sup>3</sup> EPA420-P-04-016, "Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles," Table 10, (November 2004).

- Screening value for leak definition: §95669(h) – (i) include leak definitions for 2018 through 2019, and starting January 1, 2020. The emission rates presented above indicate very low average emissions from leaks at 10,000 ppmv or 1,000 ppmv, and the emissions information supports previous SoCalGas comments recommending a leak concentration threshold of 10,000 ppm (rather than lower values). Or, at a minimum, SoCalGas has recommended that ARB evaluate the program after two years rather than presuming more stringent criteria are warranted in 2020.
- Repair schedules and maximum allowed screening value: The same two sections of the proposed rule define repair schedules based on the SV as well as the number of leaks allowed. In addition to very low emission rates at SVs of 1,000 or 10,000 ppmv presented in Tables 1 and 2, Table 3 also demonstrates the inability to equate a leak with an SV of 50,000 ppm as an especially large emitter. For currently proposed criteria based on SV tiers, analysis of the emissions benefit and costs of required actions do not withstand scrutiny when considering emission rates based on ARB study results.

F-9-17

F-9-18

#### Uncertainty from EPA Method 21 Instrumentation

The ARB report also demonstrates the arbitrary nature of leak concentration thresholds by comparing the response of Method 21 instruments. The study evaluated three different leak detection instruments that meet EPA Method 21 Performance criteria. Leaking components were monitored by each instrument in close succession. Table 4 compares measured concentrations for three instruments for leaks in the 1,000 to 10,000 ppmv range.

**Table 4. Data from Table 3-9 of the Sage Study Report “Comparative Monitoring Results for Method 21 Compatible Instruments”**

Item #	Component Description	Leak Concentration			Max / Min
		TVA (ppm)	RKI Eagle (ppm)	COSMOS (ppm)	
39	Level Controller	1,200	1,200	1,400	117%
40	Connector	3,100	2,390	3,400	142%
41	OEL	3,200	3,450	8,900	278%
42	Controller	5,000	5,400	5,800	116%
43	Pressure regulator	6,100	4,900	7,300	149%
44	Connector	6,900	3,400	10,100	297%

F-9-19

Measured hydrocarbon concentrations differed for every leak, with differences as large as a factor of 3. Comment 15 in the SoCalGas/SDG&E comments dated July 18, 2016 regarding the proposed ARB methane rule discusses why EPA Method 21 gas leak concentration measurements (i.e., screening values) have a very large uncertainty, and should not be the sole basis for leak repair thresholds, schedules, and rule compliance determinations. Separate from the discussion above regarding the emission rates in Tables 1 through 3, the data in Table 4 demonstrate additional ambiguity and uncertainty that can occur from instrumentation-based differences in defining and assessing the significance of a leak. Collectively, this information supports SoCalGas comments that a leak definition of 10,000 ppmv is more appropriate than 1,000 ppmv.

## Attachment B: Costs Estimates for LDAR and Storage Monitoring

ARB documents released on February 3, 2017 include updates to cost and emission estimates, posted on the ARB website as “Attachment 2.” Tables below summarize ARB cost estimates for LDAR and storage monitoring, and present cost estimates from SoCalGas for comparison. A summary of key points follow.

### LDAR Economic Analysis

Table 1 compares the ARB analysis to SoCalGas cost estimates for LDAR programs. As discussed in previous SoCalGas comments, available documentation indicates that ARB’s targeted emission reduction can be achieved with annual rather than quarterly survey frequency. Thus, the SoCalGas analysis includes costs for quarterly or annual surveys, and considers two values for methane global warming potential (GWP). The gray rows highlight *parameter assumptions* that differ significantly for ARB and SoCalGas. The yellow rows highlight the two primary results: total annual LDAR cost and LDAR cost effectiveness. The comparisons indicate:

- ARB’s LDAR cost estimate for quarterly surveys is similar to SoCalGas costs for *annual* surveys. The SoCalGas costs indicate quarterly surveys are about 4 times more costly than ARB’s estimate.
- The SoCalGas estimate assuming quarterly surveys and the commonly used GWP based on a 100-year time horizon (GWP = 21) shows a cost effectiveness value over 8 times higher than ARB’s estimate (i.e., \$193.78 per metric ton CO<sub>2</sub>e reduced versus \$23.48 per metric ton).

F-9-20

### Storage Monitoring Economic Analysis

Table 2 compares several storage monitoring scenarios from the ARB analysis to the SoCalGas cost estimate for continuous monitoring. This includes ambient monitoring requirements and well-related monitoring requirements in §98668(h) of the proposed rule. The yellow rows highlight total costs for different components of the storage monitoring program.

For ambient monitoring, the costs for ARB and SoCalGas are similar. However, as discussed in SoCalGas comments, the cost estimate is based on two total monitors, which is not clearly indicated in the proposed rule. If additional ambient monitors are required, costs (relative to Table 2 estimates) would increase approximately 50% for each additional monitoring location.

F-9-21

Similar to the comment below for wellhead monitoring, these costs do not include costs for infrastructure. It is unlikely that relatively remote ambient monitor sites will have power access, and significant costs could be incurred to provide power, and develop access roads, instrumentation pads, etc.

For wellhead monitoring, ARB assumes that continuous monitoring instruments will be employed with 10% or less of the wells monitored manually. Table 2 presents comparisons assuming continuous wellhead monitoring. ARB has not adequately considered costs for *manual* wellhead monitoring:

- SoCalGas anticipates that manual monitoring will be employed at some or all sites, at least in initial years of the program. As discussed in previous SoCalGas comments, additional evaluation is needed to assess the viability of continuous monitoring systems to meet proposed requirements. Many methane monitoring technologies are still experimental or developmental, such as those being developed under the DOE ARPA-E research program.
- For daily manual monitoring, SoCalGas experience is that costs are approximately \$20,000 per well per year. For example, approximately \$2.4 million per year at one facility. This is an *ongoing annual cost*.

F-9-22

- The Table 2 costs are total statewide estimates for 14 storage facilities. The total continuous wellhead monitoring costs for the 14 facilities are \$3.5 to \$7.8 million, so the average annual costs are \$250,000 to \$560,000 per facility. This estimate is significantly lower than the annual \$2.4 million cost for manual monitoring based on SoCalGas experience.
- Since manual monitoring is likely to be much more prevalent than forecast by ARB, the wellhead monitoring costs are significantly underestimated.

F-9-22  
cont.

In addition, for *continuous* wellhead monitoring, cost estimates do not include infrastructure needed to implement the program. For example, power (electricity) will not be readily available at all locations, and costs to provide power and develop pads and access roads could be significant, depending upon the location.

**Table 1. Comparison of ARB and SoCalGas Economic Analysis for Proposed LDAR.**

		ARB 2017	SCGas Quarterly (GWP = 72)	SCGas Annual (GWP = 72)	SCGas Quarterly (GWP = 21)	SCGas Annual (GWP = 21)	Notes
<b>LDAR Inspections Costs</b>							
Number of Components	A	1,585,653	1,565,168	1,565,168	1,565,168	1,565,168	ARB component count includes 20,485 well casings (excluded from SCGas analyses). Well casings require gas emission rate measurements, not Method 21 leak concentration measurements, and should not be included in this total. These costs should be determined separately.
LDAR survey team labor Rate (\$/hr)	B	\$60	\$142.06	\$142.06	\$142.06	\$142.06	ARB Labor rate based discussions with contractors. SCGas Labor rate from ICF 2016 (2-person team with travel and other ODC). A 2-person team is needed for this rule because survey requirements include carry OGI camera, recordkeeping, component counts (\$95669(n)), and initial attempt at leak repair. In addition, 2-person teams is standard procedure due to safety considerations when working at remote locations (e.g., O&G production, storage fields)
Labor hours per survey team year	C	2,080	2,080	2,080	2,080	2,080	
Inspections per year	D	4	4	1	4	1	
Components per survey team year	E	70,720	70,720	70,720	70,720	70,720	Based on inspection rate of 34 components per hour (includes preparation and travel)
Annual LDAR Inspection Cost (\$/yr)	F=A*B*C*D/E	\$11,192,845	\$26,158,561	\$6,539,640	\$26,158,561	\$6,539,640	
		\$11,192,845	\$26,158,561	\$6,539,640	\$26,158,561	\$6,539,640	Calculation check
<b>Set up Cost</b>							
Cost per Facility (\$/Facility)	G	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	
Number of Facilities	H	799	799	799	799	799	Number of Facilities at the time when the survey was conducted.
Number of Components from Survey	I	1,339,185	1,339,185	1,339,185	1,339,185	1,339,185	
Total One-time Set up Cost (\$)	J=G*H*A/I	\$1,419,076	\$1,400,743	\$1,400,743	\$1,400,743	\$1,400,743	
Capital Recovery Factor (CRF)	K	0.23	0.244	0.244	0.244	0.244	Based on experience, SCGas assumes LDAR vendors are periodically changed, assume after 5 years on average for all facilities and discount rate of 7%
Annualized Set-up Cost (\$/year)	L=J*K	\$326,387	\$341,781	\$341,781	\$341,781	\$341,781	
<b>Recordkeeping &amp; Reporting Cost</b>							
R&R Cost per Person (Survey Team )Year	M	\$15,000					
Total R&R Costs (\$)	N=M*D*A/E	\$1,345,294					Revised ARB Costs based on ICF document estimates.
Total R&R Costs (\$)	N1=P*A/I		\$2,486,032	\$677,888	\$2,486,032	\$677,888	"P" from SCGas comments dated 7/18/16 (see Attachment A, row T). Number of facilities and businesses increased by ratio of "Number of Components" and "Number of Components from Survey," which is assumed to account for new facilities added since the survey was conducted.
<b>Facility Support Cost</b>							
Facility personnel support (\$/Facility-yr)	Q=A*80*C*D/E	\$0	14,730,993	3,682,748	14,730,993	3,682,748	SCGas estimates one hour of storage facility rep time (at \$80/hr) required for every hour survey team on site , based on historical support for leak surveys at storage facilities (e.g., training, scheduling, safety orientation, survey team escort and support, M21 measurement of detected and repaired leaks, leak repair, etc. ) - ARB assumes no facility support costs. ""Following the methodology from the ICF report, the capital cost of larger repairs is not included based upon the assumption that these repairs would need to be made regardless of an LDAR program; because the operator would repair these parts regardless of the LDAR program, the program serves to identify equipment failures sooner, benefiting the operator above and beyond business as usual. Thus only those repairs that are made on a first attempt are accounted for in this estimate, and are reflected in the 34 components per hour value."
<b>Total Annual LDAR Inspection Cost</b>	R=F+L+N+N1+Q	\$12,864,526	\$43,717,367	\$11,242,058	\$43,717,367	\$11,242,058	
<b>Annual Leak Emissions (mt CH4/yr)</b>							
Annual Leak Emissions (mt CH4/yr)	S	11,407	11,407	11,407	11,407	11,407	From Tables A-1, A-2, and A-3 of Attachment 2.
LDAR Control Efficiency	T	60%	90%	80%	90%	80%	
Emission reductions by LDAR (mt CH4/yr)	U=S*T	6,844.28	10,266	9,126	10,266	9,126	
Global Warming Potential	V	72	72	72	21	21	GWP of 21 based on 100 year horizon and GWP of 72 based on 20 year horizon.
Annual Leak Emissions (mt CO2e/yr)	W=S*V	821,314	821,314	821,314	239,550	239,550	
Emission reductions by LDAR (mt CO2e/yr)	X=W*T	492,788.45	739,182.67	657,051.26	215,594.95	191,639.95	
<b>LDAR Cost Effectiveness</b>							
LDAR Cost Effectiveness (\$/mt CO2e)	Y=R/X	\$26.11	\$59.14	\$17.11	\$202.78	\$58.66	
Value of Recovered Gas	Z	\$1,293,380					
	Z1=Z*T/60%		\$1,940,070	\$1,724,507	\$1,940,070	\$1,724,507	
LDAR Cost Effectiveness with Recovered Gas Savings (\$/mt CO2e)	AA=(R-Z)/X	\$23.48	\$56.52	\$14.49	\$193.78	\$49.66	



**Table 2. Comparison of ARB and SoCalGas Economic Analysis for Proposed Storage Monitoring – Ambient and Wellhead Monitoring.**

Parameter	Parameter ID	ARB Scenario 1 (SCGas, IR 5500 at each well)	ARB Scenario 2 (ultrasonic and IR at each well)	ARB Scenario 3 (Fixed OGI at Wells)	SCGas	
<b>Continuous Ambient Air Monitoring Costs</b>						
Capital Cost per Facility (\$/Facility)	A	\$400,000	\$350,000	\$350,000	\$400,000	Costs based on ARB assumption of 2 monitors per facility. - SCGas EA: Estimated facility capital cost for multiple units (Boreal TDL based-technology) for 360 degree coverage. Actual capital costs will depend on requirements for “ambient” and “facility” monitoring, and instrument sensitivity requirements.
Capital Recovery Factor	B	0.13	0.13	0.13	0.142	10 year amortization, ARB at 5% discount rate, SCGas at 7% discount rate.
Capital Costs for Meteorological Station required by §95668(h)(5)(A)2. (\$/Facility)	C	\$0	\$0	\$0	\$20,000	Assume 2 met stations, \$10,000 each.
Annualized Capital Costs (\$/Facility-yr)	D=B*(A+C)	\$52,000	\$45,500	\$45,500	\$59,640	
Annual O&M costs (\$/Facility-yr)	E	\$52,000	\$179,000	\$179,000	\$52,000	SCGas EA: estimated costs for maintenance, calibration, spare parts, etc. Estimate 5% of monitors is replaced each year + \$10,000 annual O&M per monitor
Annual O&M costs for Meteorological Station (\$/Facility-yr)	F	\$0	\$0	\$0	\$7,680	Assume 2 met stations, 4 hours maintenance and calibrations a month per station.
Number of Facilities	G	14	14	14	14	
<b>Total Annual Cost</b>	<b>H=G*(D+E+F)</b>	<b>\$1,456,000</b>	<b>\$3,143,000</b>	<b>\$3,143,000</b>	<b>\$1,670,480</b>	
<b>Daily or Continuous Wellhead Monitoring Costs</b>						
Capital Cost per Well (\$/Well)	I	\$77,000	\$94,500	\$30,000	\$77,000	ARB Scenario 3, \$90,000 to cover three wells. Assumption not supported. SC Gas EA: 2 pair IR 5500 at each well + 10% contingency.
Annualized Capital Costs (\$/Well-yr)	J=I*B	\$10,010	\$12,285	\$3,900	\$10,934	
Annual O&M Costs (\$/Well-yr)	K	\$5,000	\$5,000	\$0	\$5,000	ARB Scenario 3, no O&M costs. Assumption not supported. SCGas EA: estimates costs for maintenance, calibration, reporting, data review, and data compilation for external audiences. Estimate 5% of equipment is replaced each year + \$3,500 annual O&M per well.
Number of Wells	L	452	452	452	452	
Annual OGI camera inspections (\$ / Facility)	M	\$0	\$0	\$123,839	\$0	ARB Scenario 3, 10% of wells require OGI. This cost is about \$38,500 per well per year. Would be less expensive to install the Fixed OGI at each well.
<b>Total Annual Cost (\$/yr)</b>	<b>N=L*(J+K)+M*G</b>	<b>\$6,784,520</b>	<b>\$7,812,820</b>	<b>\$3,496,546</b>	<b>\$7,202,168</b>	ARB Scenario 3 has a calculation error, the Fixed OGI costs should only apply to 90% of the wells.
<b>Recordkeeping &amp; Reporting</b>						
Monitoring Plan (MP) Development (\$/Facility)	O	\$20,000	\$20,000	\$20,000	\$20,000	
Capital Recovery Factor	P	0.142	0.142	0.142	0.142	Adjusted ARB CRF to match ARB total cost. ARB used SCGas CRF.
Annualized MP Development Costs (\$/Facility-yr)	Q=O*P	\$2,840	\$2,840	\$2,840	\$2,840	
Annual MP Updates (\$/Facility-yr)	R	\$4,000	\$4,000	\$4,000	\$4,000	
Annual Reporting Cost (\$/Business-yr)	S	\$20,800	\$20,800	\$20,800	\$20,800	
Number of Businesses	T	6	6	6	6	
Annual Recordkeeping Cost (\$/Facility-yr)	U	\$83,200	\$83,200	\$83,200	\$83,200	
<b>Total Annual Cost (\$/yr)</b>	<b>V=S*T+G*(Q+R+U)</b>	<b>\$1,385,360</b>	<b>\$1,385,360</b>	<b>\$1,385,360</b>	<b>\$1,385,360</b>	
<b>Screen and Repair Detected Leaks</b>						
Annual repairs (\$/Facility)	W	\$134,682			\$134,682	Annual cost to screen and repair Method 21 detected leaks in accordance with §95668(h)(5)(B)3. & 4. SCGas cost estimate from SCGas comments dated 7/18/16 (see Attachment A1, row G6).
<b>Total Annual Cost</b>	<b>X=G*W</b>	<b>\$1,885,548</b>			<b>\$1,885,548</b>	
<b>Total Annual Monitoring Cost</b>	<b>Y=H+N+V+X</b>	<b>\$11,511,428</b>	<b>\$12,341,180</b>	<b>\$8,024,906</b>	<b>\$12,143,556</b>	

## Attachment C: Additional Comments and Rule Language Modifications

Suggested Language modifications: additions and ~~deletions~~

### 1. §95667(a) Definitions

The thresholds specified in this article are associated with a concentration measurement (ppmv) not a rate (scf/hr).

(27) “Leak or fugitive leak” means the unintentional release of emissions at a ~~rate~~ concentration greater than or equal to the leak thresholds specified in this article.

F-9-23

### 2. §95668(d)(3) – Centrifugal Natural Gas Compressors

The Centrifugal Compressors section needs the same clarification language that was added to Section 95668(c)(4)(A) Reciprocating Compressors to prevent duplicative testing of seals.

F-9-24

- §95668(d)(3) Beginning January 1, 2018, components on driver engines and compressors that use a wet seal or a dry seal shall comply with the leak detection and repair requirements specified in section 95669; except for components subject to section 95668(d)(4); and,
- §95669(b)(15) A compressor wet seal which is subject to the requirements specified in section 95668(d)(4) of this subarticle.

F-9-25

### 3. Delay of Repair

Language was added to provide a means for extending the repair timeframe. Using “may” implies an approval is required.

F-9-26

- §95668(c)(3)(D)1; §95668(c)(4)(D)1; and §95668(d)(6)(A):  
“A delay of repair ~~may~~ shall be granted by the ARB Executive Officer if the owner or operator can provide proof that the parts or equipment required to make necessary repairs have been ordered.”
- §95668(h)(4); and §95668(i)(5)  
A delay of repair ~~may~~ shall be granted by the ARB Executive Officer under the following conditions:

F-9-27

### 4. §95669 – Leak Detection and Repair

- §95669(b)(1)  
Clarification is needed that LDAR is applicable to the aboveground components of wells, unless they are currently being inspected under an LDAR program. Are components currently exempt from inspection under an existing LDAR regulation exempt from this section of the proposed regulation? (ex: SCAQMD Rule 1173(l)(1)(C) “Components exclusively handling commercial natural gas.”)
  - §95669(b) (1) Components, including components found on tanks, separators, the aboveground components of wells, and pressure vessels that are subject to local

F-9-28

air district leak detection and repair **inspection** requirements if the requirements were in place prior to January 1, 2018.

F-9-28  
cont.

- §95669(c) Beginning January 1, 2018, all components, including components found on tanks, separators, **the aboveground components of** wells, and pressure vessels not identified in section 95669(b) shall be inspected and repaired within the timeframes specified in this section.

F-9-29

- §95669(b)(**15**) – see #2 above

- Clarification is needed to ensure that components with no ability to produce emissions are not subject to this regulation.

- §95669(b)(**16**) **Components on utilities and plant systems which do not contain natural gas: potable and non-potable water (cooling water, fire water, etc.), engine oil, cooling water, gasoline and diesel, septic and sewage systems, fire extinguishing systems, etc.**

F-9-30

- §95669(b)(**17**) **Compressed Gas cylinders**

F-9-31

- §95669(e):

The rule should clarify that personnel should not be required to drive daily to remote locations at a facility that are not otherwise visited solely for the purpose of an inspection. ARB has not demonstrated that this would cost-effectively reduce emissions and the associated accumulated vehicle emissions would greatly exceed the reduction from the occasional early detection of a very small leak. The following edits are recommended:

- §95669(e): “Except for inaccessible or unsafe to monitor components, owners or operators shall audio-visually inspect (by hearing and by sight) all hatches, pressure-relief valves, well casings, stuffing boxes, and pump seals for leaks or indications of leaks at least once every 24 hours for ~~facilities~~ **locations** that are visited daily, or at least once per calendar week for ~~facilities~~ **locations** that are not visited at least once every 24 hours **or at least monthly if a facility has not operated more than 200 hours in a month. The operator shall keep sufficient operating records to support the inspection frequency,**”

F-9-32

- As written, leaks detected on a Friday could require personnel to work on the Saturday to measure the leak concentration. The very small emission rates associated with the vast majority of leaks (refer to ARB Enhanced I&M Report leak rate data) does not warrant such action. For example, ARB has not demonstrated that such a requirement would be cost-effective (i.e., considered the cost for personnel to work a weekend (possibly at over-time labor rates) relative to the difference in potential emission reductions from identifying the leak a few days faster). ARB also has not considered that the GHG emissions emitted when the personnel drove to and from work (see Attachment A). The following edits are recommended:

F-9-33

- §95669(f)(1): “For leaks detected during normal business hours, the leak **concentration** measurement shall be performed ~~within 24 hours~~ **by the end of**

**the next normal business day.** For leaks detected after normal business hours or on a weekend or holiday, the deadline is shifted to the end of the next normal business day.”

F-9-33  
cont.

- §95669(g)(1)(A) “**The concentration of A**all leaks detected with the use of an OGI instrument shall be measured using **U.S. EPA Reference** Method 21 within two calendar days of initial OGI leak detection or within 14 calendar days of initial OGI leak detection of an inaccessible or unsafe to monitor component to determine compliance with the leak thresholds and repair timeframes specified in this section **subarticle. For leaks detected after normal business hours or on a weekend or holiday, the deadline is shifted to the end of the next normal business day.**”

F-9-34

- §95669(g)(3) Requiring inaccessible or unsafe to monitor components to be inspected per method 21 annually with no screening option could result in either placing personnel in an unsafe situation or a facility shut down. We propose adding language consistent with the CARB GHG Mandatory Reporting Rule

- CARB GHG Section 95154
  - (1) *Optical gas imaging instrument*
  - (2) *Method 21* “Owners or operators must use alternative leak detection devices as described in paragraph (a)(1) or (a)(2) of this section to monitor inaccessible equipment leaks or vented emissions.”
  - (4) *Optical gas imaging instrument.* An optical gas imaging instrument must be used for all source types that are inaccessible and cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.
- §95669(g)(3~~2~~) All inaccessible or unsafe to monitor components shall be inspected at least once annually using US EPA Reference Method 21 **or screened with Optical Gas Imaging instruments.**

F-9-35

- The ARB Notice of Public Availability indicates that “scheduled” was added to Section 95669(h)(3) ,Table 2 and Table 4, but it is missing from 95669(h)(3). For consistency, “scheduled” should also be added to section 95669(i)(4)

- 95669(h)(3) Critical components or critical process units shall be successfully repaired by the end of the next **scheduled** process shutdown or within 12 months from the date of initial leak detection, whichever is sooner.
- 95669(i)(4) Critical components or critical process units shall be successfully repaired by the end of the next process **scheduled** shutdown or within 12 months from the date of initial leak detection, whichever is sooner.

F-9-36

- A best practice proposed by the CPUC in the SB 1371 Leak Abatement OIR proceeding is to “require bundling of work whenever possible to prevent multiple venting of the same piping”. Rule language is needed to prevent a conflict between regulatory proceedings. During discussions with ARB staff, the question of when a shut-in or blowdown is necessary was discussed. Safety of personnel and the public are of primary concern. If repairs are required on high pressure systems, it is unsafe to perform even a

F-9-37

simple task such as tightening a flange without first reducing the pressure. An analogy would be adjusting a fitting on a garden hose (low pressure water) vs. a fire hose (high pressure).

- 95669(h)(4)(C) A delay of repair will result in a net decrease in emissions when consideration is given to bundling the repair with other, planned future work. The owner or operator can provide documentation of the planned future work to support the consideration of net emissions benefit.

1. The delay of repair shall not exceed the end of the next scheduled process shutdown or within six months, whichever is sooner.

- 95669(h) and 95669 (i) Previous comments have been submitted regarding the technical basis for Table 1 and Table 3. Originally this table was referenced as an incentive to step-down from a required quarterly inspection to annual. With the removal of the step-down inspection frequency, these tables and associated references should be deleted.

- ~~Table 1—Allowable Number of Leaks~~

<del>January 1, 2018 through December 31, 2019 Leak Threshold</del>	<del>200 or Less Components</del>	<del>More than 200 Components</del>
<del>10,000-49,999 ppmv</del>	<del>5</del>	<del>2% of total inspected</del>
<del>50,000 ppmv or greater</del>	<del>2</del>	<del>1% of total inspected</del>

- ~~Table 3—Allowable Number of Leaks~~

<del>On or After January 1, 2020 Leak Threshold</del>	<del>200 or Less Components</del>	<del>More than 200 Components</del>
<del>1,000-9,999 ppmv</del>	<del>5</del>	<del>2% of total inspected</del>
<del>10,000-49,999 ppmv</del>	<del>2</del>	<del>1% of total inspected</del>
<del>50,000 ppmv or greater</del>	<del>0</del>	<del>0</del>

- 95669(o) The sections limiting the number of leaks should be deleted. Studies, including the ARB Enhanced I&M Report, have shown that a leak concentration measured by EPA Reference Method 21 is a very poor predictor of the leak's mass flow rate. Further, as discussed below, the sections limiting the number of leaks imply that leaks can be prevented, which is inconsistent with a basic, common understanding of leak emissions and LDAR program objectives.

- ~~(1) Between January 1, 2018 and December 31, 2019, no facility shall exceed the number of allowable leaks specified in Table 1 during any an ARB Executive Officer inspection period as determined by the ARB Executive Officer or by the facility owner or operator in accordance with US EPA Reference Method 21, excluding the use of PID instruments.~~
- ~~(2) On or after January 1, 2020, no facility shall exceed the number of allowable leaks specified in Table 3 during any an ARB Executive Officer inspection period as determined by the ARB Executive Officer or by the facility owner or operator~~

F-9-37  
cont.

F-9-38

F-9-39

~~in accordance with US EPA Reference Method 21, excluding the use of PID instruments.~~

F-9-39  
cont.

- 95669(o)(5) The notice of public availability states that this section is necessary to ensure that facilities are maintained in compliance with the standards. This is inconsistent with the objective of LDAR programs, where leak surveys are intended to discover and repair leaks. If leaks did not occur over time, repairs could be completed once and no further actions would be required. LDAR requires periodic leak surveys because leaks in pressurized systems will occur regardless of operator diligence – e.g., due to thermal cycling, vibration, etc. associated with typical operations of the affected components. This section implies that all leaks can be prevented, which is inconsistent with a basic, common understanding of leak emissions and LDAR program objectives, therefore this section should be deleted.
  - ~~95669(o)(5) Except for the fourth (4th) quarterly inspection of each calendar year, leaks discovered during an operator conducted inspection shall not constitute a violation if the leaking components are repaired within the timeframes specified in this subarticle~~

F-9-40

#### 5. **95671(f)(1)(b) Vapor Collection Systems and Vapor Control Devices.**

For consistency and to reduce potential conflict with other section of this regulation, the delay of repair language should be added to this section. This allows for instances where additional time may be required to address technical and safety issues, long lead times, or to obtain permits.

**§95671(f)(1)(b) A delay of repair shall be granted by the ARB Executive Officer if the owner or operator can provide proof that the parts or equipment required to make necessary repairs have been ordered.**

**i. A delay of repair to obtain parts or equipment shall not exceed 30 calendar days, or 60 days from the date from of the initial measurement, unless the owner or operator notifies the ARB Executive Officer to report the delay and provides an estimated time by which the repairs will be completed.**

F-9-41

#### 6. **§95673- Reporting Requirements**

- §95669 (9): The reporting requirement to report an alarm 4 times the baseline conditions (8 ppm if 2 ppm is baseline) does not take into account any time weighted integrated average (such as a 20 minute average).
- This alarm limit does not consider if it is a leak from the facility versus external sources (e.g., biogenic or other sources).
- Alarm reporting should be revised to only include those incidents confirmed to be from the facility and should be based on a defined averaging period rather than an instantaneous measurement, which could be caused by any number of perturbations.

F-9-42

#### 7. **Appendix C**

- Appendix C Test Procedure for Determining Annual Flash Emission Rate of Gaseous Compounds from Crude Oil, Condensate, and Produced Water, §10.3: The bubble point pressure and sample integrity check is flawed:
  - Transferring the sample from a floating piston cylinder to a double valve cylinder may compromise the sample (e.g., loss of volatile hydrocarbons and/or addition of air). Further, water-soluble species (e.g. CO<sub>2</sub>, methane) could be transferred from the hydrocarbon phase in the double valve cylinder.
  - The graphing procedure in sub-section (g) appears to assume the bubble point pressure is the same or very close to the sample collection pressure. If the actual bubble point pressure is much less than or much greater than the sample collection pressure, then all six data points could be in a straight line. Or, the bubble point pressure could be between two of the three pressures below or above the sample collection pressure.

February 21, 2017

Elizabeth Scheehle, Branch Chief, Oil and Gas and GHG Mitigation Branch  
California Air Resources Board  
1001 "I" St., Sacramento, CA, 95814

Via Electronic Submittal:

[https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=oilandgas2016&comm\\_period=1](https://www.arb.ca.gov/lispub/comm/bcsubform.php?listname=oilandgas2016&comm_period=1)

**Re: Letter of Support and Suggested Improvements for the Revised Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities**

Dear Ms. Scheehle,

Please accept this letter on behalf of 32 environmental justice, public health, and public interest institutions representing millions of Americans in support of the proposed rule to regulate greenhouse gas emissions from oil and gas facilities in California.

We commend the California Air Resources Board ("CARB") staff for drafting a proposal that directly regulates methane and associated emissions from a diverse suite of new and existing oil and gas sources. The provisions contained in the draft represent a model for the nation, including the quarterly baseline inspection requirement for facilities, the use of continuous ambient air quality monitoring along the fencelines of natural gas storage facilities, and the prioritization of natural gas capture over combustion requirements for a suite of equipment. This draft demonstrates the public health and welfare benefits of the rule, and showcases California as the foremost leader in tackling serious clean air and environmental issues.

F-10-1

While we applaud the agency's effort to enact a strong rule, we are concerned that the timeframe for adopting the rule and implementing its provisions continues to slip – with the implementing timeframe delayed at least a year from the initial regulatory proposals. Additionally, we urge the Board to enumerate a well-developed implementation plan that lays out a detailed roadmap for how CARB and local air pollution districts will work together to effectively and efficiently implement the new regulations, including the timetable for periodic government audits of newly regulated facilities. Since the air pollution from oil and gas operations is a global problem, it is imperative for California to take strong action in ensuring the best leak-detection and repair technology is being used and inspections are being enforced – only then will a clear example be set for the rest of the nation and the world demonstrating what is possible.

F-10-2

As a growing body of evidence demonstrates, there are significant negative public health and environmental impacts associated with pollution from oil and gas, with many of the worst impacts falling on communities adjacent to oil and gas operations. Short-lived pollutants like methane are warming the planet in ways that impact us at the local level. Studies show that along with the release of strong climate pollutants like methane, oil and gas production releases harmful co-pollutants like volatile organic compounds that contribute to ozone formation, impacting lung health, and toxic chemicals like benzene, which is a known human carcinogen. In fact, CARB's recently published report, titled "Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities," verifies the presence of toxic compounds in many of the identified leaks within the 39 oil and gas facilities sampled throughout California in 2015. It is clear from this data that the need to diminish leaks for economic, climate and health reasons is pressing.

Unfortunately, but not surprisingly, the communities most impacted by oil and gas pollution are often low-income communities and communities of color that are already disproportionately vulnerable to socio-economic and environmental hazards. Residents of the most impacted communities throughout California, some of which live fewer than 30 feet away from active production facilities, have experienced firsthand the harmful effects of oil and gas pollution. Reported symptoms from residents living near oil and gas operations have included onset of asthma and other respiratory problems, nausea, dizziness, loss of smell, and frequent migraines. These reports have been corroborated by studies showing, among other things, that increased residential oil and gas production increases the risk of asthma exacerbations. Additionally, science shows that our most vulnerable and defenseless populations – children, pregnant women, and the elderly – are most susceptible to experiencing negative health impacts from oil and gas pollution. To address these concerns, we recommend the rule roll-out, both by the state and local air districts, prioritize implementation, consistent and timely oversight, and regulatory enforcement at facilities in close proximity to disadvantaged communities and low-income communities of color identified in the top 25% of CalEnviroScreen 3.0.

In order to ensure that the proposed regulation results in maximum reductions in emissions that harm community health, we support CARB in its efforts to maintain stringent leak detection and repair requirements applicable to facilities with the potential to leak or inadvertently vent harmful pollutants. For these reasons, we applaud CARB for remaining committed to requiring quarterly inspections – without a step down. As the rule is implemented, leaks should become less prevalent due to the increased inspection, repair and oversight requirements – this is a beneficial and intended result. However, data shows that the industry has

F-10-3



a long way to go before frequent inspections lose their benefits. Studies show the way to combat the problem of super-emitters and oil and gas leaks is frequent inspection and maintenance – such requirements must remain in place even as emissions decline. For these reasons, CARB's decision to reject a step-down provision for leak inspections is critical toward ensuring that the rule is sufficiently protecting the health and welfare of nearby communities.

Thank you for taking seriously the concerns of our communities.

Sincerely,

Vinai Decena RN, PHN  
Northern California Program Coordinator, Alliance of Nurses for Healthy Environments

Bonnie Holmes-Gen  
Senior Director, Air Quality and Climate Change, American Lung Association in California

Catherine Garoupa-White  
Californians Against Fracking

Jane Williams  
Executive Director, California Communities Against Toxics

Diana Vazquez  
Policy Advocate, California Environmental Justice Alliance (CEJA)

Jena Price  
Legislative Affairs Manager, California League of Conservation Voters (CLCV)

Bill Magavern  
Policy Director, Coalition for Clean Air

Keith Nakatani  
Oil and Gas Program Manager, Clean Water Action

Michele Hasson, MPP  
Policy Director, Center for Community Action & Environmental Justice (CCA EJ)

Sue Chiang  
Pollution Prevention Director, Center for Environmental Health

Madeline Stano  
Staff Attorney, Center for Race Poverty and the Environment

Nayamin Martinez  
Director, Central California Environmental Justice Network

Dolores Weller  
Director, Central Valley Air Quality (CVAQ) Coalition

Paul Ferrazzi  
Executive Director, Citizens Coalition for a Safe Environment (CCSE)

Darin Schroeder  
Associate Attorney, Clean Air Task Force

Jonathan Parfrey  
Executive Director, Climate Resolve

Jennifer Krill  
Executive Director, Earthworks

Taylor Thomas  
Research and Policy Analyst, East Yard Communities for Environmental Justice

Dan Jacobson  
State Director, Environment California

Timothy O'Connor  
Director of California Oil and Gas, Environmental Defense Fund

Bill Allayaud  
California Director of Government Affairs, Environmental Working Group

Patricia McPherson  
President, Grassroots Coalition

Jeff Kuyper  
Executive Director, Los Padres ForestWatch

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Briana Mordick, Senior Scientist  
Meleah Geertsma, Senior Attorney  
Natural Resources Defense Council

Joel Ervice  
Associate Director, Regional Asthma Management and Prevention (RAMP)

Matt Pakucko  
President and Co-Founder, Save Porter Ranch

Elly Benson  
Staff Attorney, Sierra Club

Dan York  
Vice President, The Wildlands Conservancy

Jason Barbose  
Western States Policy Manager, Union of Concerned Scientists

Sandra Fluke  
California State Director, Voices for Progress

Dr. Elizabeth Dougherty  
Director, Wholly H2O



## Attachment A

**WSPA Comments on 15-day Modifications to draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)**

**Circulation Tanks**

**Issue 1:** Proposed section 95668(b)(2)(A) allows owners or operators of circulation tanks to comply with the requirement to conduct technology assessments in three different production fields by either (1) conducting assessments in three fields individually or (2) being part of a group of owners or operators who conduct assessments in three different production fields. In order to meet (2), section 95668(b)(2)(A)1 allows an owner or operator to conduct a technology assessment in one or more fields and submit it to ARB, to be combined with technology assessments from other owners or operators, in order to reach the required three different production fields. WSPA requests that ARB clarify that the option in subsection 95668(b)(2)(A)1. is a method by which to meet the requirement in section 95668(b)(2)(A).

F-11-1

**Recommendation 1:** WSPA recommends that ARB clarify proposed section 95668(b)(2)(A) as follows:

*(A)1. In order to comply with section 95668(b)(2)(A), individual owners or operators may conduct a technology assessment and emissions testing within one or more production fields and submit the results to ARB, which will be combined with technical assessments performed by other owners or operators.*

**Issue 2:** Proposed section 95668(b) requires owners or operators of circulation tanks to conduct a technology assessment which includes the information listed in section 95668(b)(2)(C). The proposed regulation refers to the “technology assessment and emissions testing” in some places and only the “technology assessment” in others. Because section 95668(b)(2)(C) currently lists the information that must be included in a technology assessment, including test results, WSPA believes that the proposed regulation should simply reference the “technology assessment,” whose requirements are specified in section 95668(b)(2)(C).

WSPA's requested changes and clarifications to section 95668(b)(2)(C) (Issue 3 below) also support this suggested modification.

**Recommendation 2:** WSPA recommends that ARB clarify proposed section 95668(b) as follows:

F-11-2

*(2)(A) Each owner or operator, individually or as part of a group of owners and operators, must conduct a technology assessment ~~and emissions testing~~ in at least three different production fields from wells with different characteristics, such as depth of well or API gravity of crude oil or condensate.*

*(2)(A)1. Individual owners or operators may conduct a technology assessment ~~and emissions testing~~ within one or more production fields and submit the results to ARB, which will be combined with technical assessments performed by other owners or operators.*

*(3) The ARB Executive Officer will review the results of the technology assessment ~~and emissions testing~~ specified in section 95668(b)(2) and provide a determination on the installation of vapor collection and control equipment by no later than July 1, 2019.*

**Issue 3:** As stated previously in our comments dated July 18, 2016, WSPA's primary concern with the proposed control measures for circulation tanks is safety of the technology when used in practice. WSPA appreciates ARB's consideration of our comments and incorporation of a safety evaluation in the proposed regulation. WSPA believes that a comprehensive safety evaluation of the capture and control technologies must be conducted to determine if they can be installed and operated safely. Please see Attachment B for an evaluation of the safety concerns, performed by an independent safety expert, associated with the operation of capture and control equipment that has been considered to date.

F-11-3

## Attachment A

### WSPA Comments on 15-day Modifications to draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)

WSPA also requests that ARB clarify that the listed requirements for a technology assessment in section 95668(b)(2)(C), including emissions testing, only apply in so far as they can be completed in a safe and feasible manner. For instance, WSPA believes that should a technology be shown to be infeasible or unsafe in the field, no further test results or data, such as those listed in (C)5 or (C)6, should be collected. WSPA recommends that ARB clarify, either by amending section 95668(b)(2)(C) as suggested below or in its response to comments, that each category of information listed in that subsection is not required for every technology assessment and that the technology assessment may end when a technology is found to be infeasible or unsafe in practice.

**Recommendation 3:** WSPA recommends that ARB clarify the proposed section 95668(b)(2)(C) as follows:

- (C) *The technology assessment shall include **as applicable**, but is not limited to, the following information relating to vapor collection and control equipment:*
- 1. List of vapor collection and control equipment evaluated;*
  - 2. Test results demonstrating the functionality, emissions results, and technical feasibility of the equipment with written statements provided by equipment manufacturers;*
  - 3. Costs of the equipment;*
  - 4. Safety aspects related to the installation **and operation** of the equipment;*
  - 5. Test results that provide the fuel flow rate and Higher Heating Value of gas collected; and*
  - 6. Test results that provide the report shall include the results of testing conducted by the owner or operator or equipment manufacturers that demonstrate the vapor collection and control efficiency and methane, criteria pollutant, and toxic air contaminant emissions before and after installation of the equipment.*

**Issue 4:** As currently drafted, section 95668(b)(4)(A) does not specify whether it applies only to technology assessments already submitted, or whether it means that ARB can require owners or operators to continue to complete technology assessments beyond January 1, 2019. ARB's "Notice of Public Availability of Modified Text and Availability of Additional Public Documents and/or Information" p. 7 suggests that ARB intended this section to apply only to the scenario in which ARB had received a technology assessment by January 1, 2019, but was unable to make a determination on that assessment by July 1, 2019. WSPA requests that ARB clarify whether this section is meant to give ARB additional time in which to complete its review and determination of technology assessments, or to allow ARB to continue requesting technology assessments from owners or operators beyond January 1, 2019.

**Recommendation 4:** WSPA recommends that ARB clarify the proposed section 95668(b)(4) as follows:

*If ARB has not made a determination on **a technology assessment submitted under section 95668(b)(2) ~~the installation of vapor collection and control equipment~~** by July 1, 2019, an owner or operator to whom that determination would apply may continue to operate circulation tanks at a level below 95% vapor collection and control efficiency until 180 days after ARB makes the late determination.*

#### Well Casing Vents

**Issue 5:** Section 95668(g)(1) requires operators to measure natural gas flow rate from open well casing vents. It is our understanding that ARB's intent is to only require natural gas flow rate monitoring for wells with casing vents *normally* open to the atmosphere. An operator does not have to measure a well casing vent that is normally closed but may be temporarily opened for maintenance or monitoring. WSPA recommends that ARB clarify this intent to avoid confusion.

F-11-3  
cont.

F-11-4

F-11-5

## Attachment A

### WSPA Comments on 15-day Modifications to draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)

**Recommendation 5:** WSPA suggests that section 95668(g)(1) be clarified as follows:

*(1) Beginning January 1, 2018, owners or operators of wells located at facilities located in sectors listed in section 95666 with a well casing vent that is **normally** open to the atmosphere shall measure the natural gas flow rate from the well casing vent annually by direct measurement (high volume sampling, bagging, calibrated flow measuring instrument)...*

F-11-5  
cont.

#### Leak Detection and Repair

**Issue 6:** In Section 95669(b)(2) the phrase “exclusively for crude oil with an API Gravity less than 20” is used. It is our understanding that ARB’s intent is to exclude components on equipment and processes used in crude oil production where the API Gravity is less than 20.

**Recommendation 6:** WSPA suggests that section 95669(b)(2) be clarified as follows:

*(2) Components, -- including components found on tanks, separators, wells, and pressure vessels – used exclusively for crude oil **production** with an API Gravity less than 20 averaged on an annual basis. The average annual API gravity shall be determined using certified reports submitted to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources.*

F-11-6

**Issue 7:** WSPA will continue to point out that there is no Method 21 inspection procedure for pipes. Method 21 states, “place the probe inlet at the surface of the component interface where leakage could occur.” Therefore, there needs to be a suspected leak path in order to effectively implement Method 21, which does not exist on a run of pipe. If a pipe leak is detected by some other means such as audio-visual inspections, then it can be measured by Method 21. ARB is already requiring audio-visual inspections on pipes annually.

F-11-7

**Recommendation 7:** WSPA recommends that ARB exclude pipes from the quarterly Method 21 inspections. WSPA suggests that section 95669(g)(1) be clarified as follows:

*(g) At least once each calendar quarter, all components, **except components identified in Section 95669(e)(1)**, shall be tested for leaks of total hydrocarbons in units of parts per million volume (ppmv) calibrated as methane in accordance with US EPA Reference Method 21 excluding the use of PID instruments.*

**Issue 8:** WSPA appreciates that ARB is allowing the use of OGI as a screening process for leak detection. As stated in previous comment letters, WSPA believes that operators should be allowed to use cost-effective technologies to meet the emissions reduction targets of the LDAR requirements. While OGI (followed by Method 21) is more cost-effective than Method 21 alone, there are several emerging control technologies that may be even more cost-effective in the future in achieving the target emissions reductions. WSPA understands that ARB is willing to consider any emerging LDAR technologies as an option, if such technologies can be proven to meet the emission reduction targets. However, this intent is not stated in the regulation which is limited to the use of OGI as a screening tool.

F-11-8

**Recommendation 8:** WSPA recommends that ARB state the intent that ARB will consider reviewing emerging technologies for LDAR and consider allowing such technologies as an option, if they can be proven to meet the emission reduction targets. WSPA recommends that this intent be made clear either in the regulatory text or in the Adopting Resolution/Final Statement of Reasons (FSOR).

**Issue 9:** As ARB has noted several times and as explained repeatedly in WSPA’s previous Comment Letters, the majority of facilities are already in a mature LDAR program implemented by a local air district. Several years of data demonstrates that these facilities have had very low leak rates. Unfortunately, ARB

F-11-9

## Attachment A

### WSPA Comments on 15-day Modifications to draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)

is requiring quarterly inspections indefinitely. WSPA is disappointed that ARB has removed the step-down provision that would act as a reward for operators that work hard at minimizing the number of leaks from their operations. WSPA re-iterates that removal of step-down provision will lead to extremely onerous and costly inspections without any significant emissions benefit.

F-11-9  
cont.

**Recommendation 9:** WSPA recommends that ARB review leak data that will be reported under the LDAR program. WSPA requests that ARB include references in either the Adopting Resolution or the Regulation to allow evaluation for potential future re-consideration of step-down provision for operators who demonstrate very low leak rates.

**Issue 10:** There is a typographical error in Section 95669(i)(5)(A)(1).

**Recommendation 10:** WSPA suggests that section 95669(i)(5)(A)(1) be revised as follows:

1. A delay of repair to obtain parts or equipment shall not exceed 30 calendar days from the date identified in Table 24 by which repairs must be made, unless the owner or operator notifies the ARB Executive Officer to report the delay and provides an estimated time by which the repairs will be completed.

F-11-10

#### Vapor Collection Systems and Vapor Control Devices

**Issue 11:** Proposed section 95671(e) requires operators to remove circulation tanks from service by January 1, 2020 if vapor control systems cannot be installed. However, section 95668(b)(4) allows operators to continue to operate circulation tanks at a level below 95% vapor collection and control efficiency if the ARB Executive Officer makes a determination that controlling emissions is not possible or until 180 days after ARB has made a determination on a technology assessment, if such determination is not made by July 1, 2019. Proposed section 95671(e) does not take into account the potential for ARB to find, based on the technology assessment, that controlling emissions is not possible, or for the potential for a late determination by ARB as to a technology assessment as noted in section 95668(b)(4)(A). Both of these situations allow operators to continue to operate circulation tanks at a level below 95% vapor collection and control beyond January 1, 2020.

F-11-11

**Recommendation 11:** WSPA suggests that proposed section 95671(e) be clarified as follows:

*If the collected vapors cannot be controlled as specified in sections 95671(b) through (d) of this subarticle, the equipment subject to the vapor collection and control requirements specified in this subarticle may not be used or installed and must be removed from service by January 1, 2019, and circulation tanks may not be used and must be removed from service by January 1, 2020, unless the ARB Executive Officer has made a determination under section 95668(b)(4) that controlling emissions is not possible or section 95668(b)(4)(A) applies.*

#### Reporting Requirements

**Issue 12:** WSPA appreciates the inclusion of our previous comment in the clarification of annual reporting deadlines for previous year's data. WSPA's understanding of the reporting requirements in section 95673 is that the annual report for a calendar year will be due on July 1 of the following year. As such, the first annual report will be due July 1, 2019 for the data from calendar year 2018.

F-11-12

**Recommendation 12:** WSPA recommends that ARB clarify the reporting requirements as follows:

## Attachment A

### WSPA Comments on 15-day Modifications to draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)

(a) Beginning ~~in January 1, 2018~~ 2019, owners or operators of facilities located in sectors listed in section 95666 subject to requirements specified in sections 95668 and 95669 shall report the following information to ARB ~~for each calendar year~~ by July 1st of ~~each calendar~~ the following year ~~(first report for calendar year 2018 will be due July 1, 2019)~~ unless otherwise specified...

F-11-12  
cont.





**Western States Petroleum Association**  
Credible Solutions • Responsive Service • Since 1907

**Thomas A. Umenhofer, CCM, REPA**  
Vice President

February 21, 2017

Sent via email: [jim.nyarady@arb.ca.gov](mailto:jim.nyarady@arb.ca.gov)

Mr. Jim Nyarady  
Manager, Oil and Gas Section  
California Air Resources Control Board  
1001 I Street  
Sacramento, CA 95814

Re: WSPA Comments on 15-day Modifications to Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (February 2017)

Dear Mr. Nyarady:

The Western States Petroleum Association (WSPA) appreciates the opportunity to provide comments on the California Air Resources Board (ARB) draft regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (the Methane Rule) released on February 10, 2017 for a 15-day public comment period. WSPA is a non-profit trade association representing companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California and four other western states.

WSPA and its member companies would like to express our appreciation to ARB for the stakeholder process that has allowed WSPA and others to provide feedback during the past two years. Based on a review of the 15-day draft, WSPA still has specific concerns with the proposed regulatory language. These concerns are outlined below and further detailed in the enclosure with this letter. The key general areas of concern include, without limitation, the following:

- Circulation tanks
- Vapor Collection Systems and Vapor Control Devices
- Leak Detection and Repair ("LDAR") frequency
- Reporting Requirements

**Circulation Tanks**

Circulation tanks are portable tanks used to circulate water into a well after a well stimulation treatment. WSPA appreciates ARB's effort to allow for technological advancements and safety to be the driver of control requirements on these types of tanks. As WSPA has stated in our previous comment letters on this issue, some of the proposed control requirements would create an unsafe situation or would result in an increase in criteria and greenhouse gas emissions from current emissions from circulation tanks. In addition, currently, it is infeasible to comply with the 95% control efficiency requirements of the proposed regulation, as there is no control technology available today capable of controlling emissions from circulation tanks without supplemental fuel and that can be operated in a safe manner. While it is our understanding that the intent is to allow for Best Management Practices (BMPs) in the interim and beyond in the event that no

F-12-1  
(summary of  
F-11-1 thru  
F-11-4)

technology is available by 2020, we still believe further clarification needs to be included in the rule language.

F-12-1 cont.  
(summary of  
F-11-1 thru  
F-11-4)

### **Vapor Collection Systems and Vapor Control Devices**

The Vapor Collection Systems and Vapor Control Devices sections also need to be clarified. Circulation tanks are portable equipment and any control devices and collection systems on portable equipment are not feasible from an engineering perspective and will actually result in *increased* GHG emissions from the equipment that would be required to dispose of the minuscule amount of methane from the circulation tanks.

F-12-2  
(summary of  
F-11-10 thru  
F-11-11)

### **LDAR**

All WSPA members are currently subject to an LDAR program either through the San Joaquin Valley Air Pollution Control District (SJVAPCD) or other air districts with oil and gas operations. The ARB LDAR requirements in this rule will result in a dramatic expansion of existing LDAR programs. WSPA believes it is vital in the SJVAPCD area that the local air district be the lead agency in implementing the Methane Rule to avoid operators having to comply with two programs, two sets of inspections, and two recordkeeping requirements – one for the local APCD and one for the ARB. Also, as currently written, LDAR will be required for systems that in practical application do not have the potential to emit methane. We expect the cost to comply with the LDAR provisions in the proposed regulation will be significantly more than estimated by ARB and will present difficulty for owners and operators in finding competent contractors to perform and correctly document inspections.

WSPA is disappointed that ARB removed the “step-down” provision in the last two versions of the regulation. While we understand the concerns raised in regards to natural gas storage projects, we need to emphasize the immense difference between oil and gas production and natural gas storage, particularly as it relates to the potential for catastrophic leaks. WSPA members have implemented leak inspection and repair programs on oil and gas equipment for the past several decades. As WSPA has stated in our previous comments, based on extensive local air district LDAR programs, the average amount of leaks found are minimal. The Federal EPA only requires semi-annual inspections at well site facilities. The SJVAPCD program, which has been in place for decades, allows operators to do annual inspections once they have submitted at least five quarterly reports without an exceedance of the leak standards. Since the ARB LDAR program simply incorporates more components requiring inspection, it would be more efficient for the programs requirements to correlate.

F-12-3  
(summary of  
F-11-6 thru  
F-11-9)

In addition to the issues of the LDAR program in its practicable application, the frequency for testing will result in an administrative nightmare not only for operators but for the SJVAPCD and the ARB. This further enhances the need for one lead agency to implement this rule to prevent, as much as possible, duplicative requirements. WSPA continues to recommend that the local air districts implement the rule, specifically in the San Joaquin Valley where 85% of the in-state oil and gas production occurs.

Therefore, WSPA requests that ARB revisit this section with industry in the future and reconsider including the step-down provision based on data and information that demonstrate that leaks are insignificant.

### **Reporting Requirements**

The reporting schedule as written is unclear and WSPA recommends that ARB clarify the requirements as suggested in the attached comments.

F-12-4  
(summary of  
F-11-12)



Mr. Jim Nyarady  
February 21, 2017  
Page 3

Attached is an enclosure with specific WSPA recommendations on the proposed Modifications to Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations (Attachment A) as well as a safety analysis on controls for circulation tanks, conducted by Michael Juarena, a certified safety professional and Senior Consultant at Safety Management Systems (Attachment B).

Thank you for your consideration of WSPA's comments. If you have any questions, please contact me at (805) 701-9142 or email [tom@wspa.org](mailto:tom@wspa.org), or Jenifer Pitcher at (661) 321-0884 or email [jpitcher@wspa.org](mailto:jpitcher@wspa.org).

Sincerely,



enclosures

cc: Richard Corey, ARB  
Elizabeth Scheehle, ARB  
Ken Harris, DOGGR  
Jenifer Pitcher, WSPA

September 13, 2016

Jenifer Pitcher  
Senior Coordinator, San Joaquin Valley Region  
Western States Petroleum Association (WSPA)  
901 Tower Way Suite 300  
Bakersfield, CA 93309

RE: Safety Analysis of Proposed California Air Resources Board's (ARB's) Vapor Recovery Requirements under the Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations

## Background

I received a request from WSPA to review the vapor recovery requirements proposed in Sections 95668 (b) and 95671 under the Draft Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Operations and provide a professional review on its impact on safety. The options presented and reviewed were as follows:

- Capture and utilize vapors
  - Introduce vapors from circulation tanks into a "fuel system".
  - Introduce vapors from circulation tanks into sales gas system.
- Combustion of vapors
  - Introduce vapors from circulation tanks into a flare.
  - Introduce vapors from circulation tanks into an incinerator/furnace.

I have reviewed the proposed options and the following presents the basis of analysis, risk assessment and my conclusion.

## Basis of Analysis

Tools utilized for the basis of analysis are sound and proven in the safety profession. These tools are utilized to ensure personal biases do not skew the data or facts and this analysis is based on tolerable risk criteria. The overlaying tool utilized in this report is "Risk Vs Benefit". Simply put the benefit of any action should outweigh the risk taken. The action taken should increase or better a situation. If the action taken decreases benefit or introduces additional or intolerable risk, then the action should not be undertaken and be reconsidered until a better process can be defined or developed.

There are many applications when using the "Risk Vs Benefit" tool so the parameters of analysis should be defined before starting, however all "Risk Vs Benefit" analysis is judged on the "Hierarchy of Safety" of risk:

- First – Risk to and Safety of People (workforce / public).
- Second - Risk to and Safety of the Environment.

For the purposes of this analysis, risk will be identified in the following categories:

- Intolerable Risk – Not in line with accepted safety practices or cannot be managed safely.
- Tolerable Risk – Risk that can be managed using current safety practices however increases additional risk not in place before. It must be noted that even with safety process in place, risk remains and therefore there is a potential for incident.

## **Risk Analysis**

### **Intolerable Risk**

#### **Capture and Utilize Vapors**

The major cause of accidents in the oil & gas industry is fire. There are numerous flammable & inflammable fluids & solids present in the oil & gas facilities, which can ignite to cause fire.<sup>i</sup> The vapors from circulation tanks are expected to contain high amounts of oxygen. The regulatory requirement to capture these oxygen-rich vapors from circulation tanks and introducing them into a closed fuel/sales system poses intolerable risk of fire and potentially disastrous results. This control option is against all process and safety engineering practices<sup>ii</sup>.

This can be further understood by reviewing the basics of fire. The concept of fire can be well understood and explained using a simple model called the Fire Triangle. The three factors contributing to cause a fire are: Fuel, Oxidizing agent (Oxygen) & Heat. A fire is caused if all the three factors are present in mixture in the required concentration. Reverse is true for stopping the fire to happen i.e., if any one of the factors are eliminated or the concentration of any one can be kept below the required level then fire can be eliminated<sup>iii</sup>. In the Oil and Gas industry, it is a standard practice to eliminate oxygen from the process streams to eliminate any potential for explosion to occur.

#### **Flaring or Incineration of Vapors**

The technologies we have evaluated so far are still in the process of being proven, and process hazards and risks still need to be evaluated and not oversimplified. When some of these technologies have been tested in real life situations we will also need to evaluate the work process against OSHA regulations to ensure they comply process safety management practices<sup>iv</sup>.

Flaring or incineration of vapors would require some method of pulling the vapors from the circulation tank due to the very low volume of gas returned during the clean out phase<sup>v</sup>. Operators would have to use a compressor for this purpose. However, due to the high volume of oxygen in the vapors from the circulation tanks, the compression equipment would cause an extreme hazard and risk.

Bladder technology is unsafe because the concept of transporting a partially charged bladder tank is both unsafe and is a violation of Department of Transportation, Title 49 Subchapter C—Hazardous Materials Regulations.

### **Tolerable Risk**

#### **Flaring or Incineration of Vapors**

- Due to the increased amount of equipment for the vapor recovery and flare system, a larger footprint would be necessary at the well location. However, many locations are very tight or have limited spacing. As such, vehicle traffic will increase to move equipment more frequently.
- The increased amount of process equipment due to the flaring or incineration process will increase vehicle traffic and the use of transportation equipment. This will also increase the emissions from the diesel combustion and increase the risk for incidents due to increased volume of traffic. The increased traffic risk can be managed (however not eliminated).
- Due to the increased process equipment, additional manpower, lifting, mobilization, and maintenance will be required leading to increased operational concerns. Again, while these processes can be managed it increases the potential for incidents.

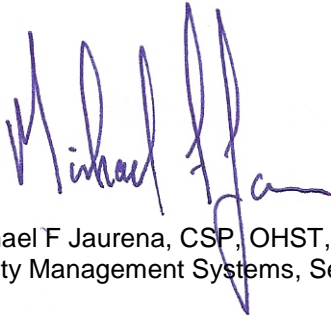
## **Conclusion**

The potential safety risks associated with the proposed control options on circulation tanks is grossly disproportionate to the emissions benefit of the proposed ARB regulation. Even where risk can be

F-13-1

managed, the total increased risk to the safety of people is not consistent with sound safety practices of protecting people over the environment. In this case, the proposed regulation increases both the risk to people and ultimately increases the total emissions to the environment.

F-13-1  
cont.



Michael F Jaurena, CSP, OHST, CUSP  
Safety Management Systems, Senior Consultant

<sup>i</sup> <http://www.piping-engineering.com/fire-and-explosion-in-oil-gas-industries-and-related-qas.html>

<sup>ii</sup> HERSEY, M. D. (1924), A STUDY OF THE OXYGEN-OIL EXPLOSION HAZARD\*. Journal of the American Society for Naval Engineers, 36: 231–243. doi:10.1111/j.1559-3584.1924.tb05446.x

<sup>iii</sup> <http://www.piping-engineering.com/fire-and-explosion-in-oil-gas-industries-and-related-qas.html>

<sup>iv</sup> <https://www.dir.ca.gov/Title8/5189.html>

<sup>v</sup> [http://www.wspa.org/sites/default/files/uploads/Recirculation%20Tank%20Testing%20Report%201-29-16\\_Clean.pdf](http://www.wspa.org/sites/default/files/uploads/Recirculation%20Tank%20Testing%20Report%201-29-16_Clean.pdf)



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February 21, 2017

Elizabeth Scheehle  
Chief, Oil and GHG Mitigation Branch  
California Air Resources Board  
1001 "I" Street  
Sacramento, CA 95814

To Ms. Scheehle,

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide feedback on the proposed modifications to the Air Resources Board's (ARB) Proposed Regulation for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (Proposed Regulation), as released on February 3, 2017.

PG&E is committed to helping California achieve its ambitious climate goals while maintaining its vibrant economy, and supports ARB's efforts to establish regulatory and market mechanisms to achieve greenhouse gas (GHG) emissions reductions. PG&E appreciates many of modifications to the Proposed Regulation put forth by ARB to address the concerns expressed by various stakeholders but several key issues still remain.

These comments supplement and incorporate by reference previous comments submitted to ARB on July 21, 2016, and February 26, 2016. PG&E's key recommendations are as follows:

- Enforcement of leak thresholds should be delayed until 2022 to allow time for development of a more accurate methodology than Method 21 to determine emissions violations.
- ARB should approve ambient air monitoring equipment specifications in the air monitoring plans and remove the 250 ppb accuracy requirement from the regulation.
- ARB should include provisions to allow a delay of repair for equipment-related issues for natural gas storage facility sensors.
- The notification requirements for natural gas storage facilities should allow verification of the severity of a leak based on a flow-rate threshold prior to notification, exclude wellhead component leaks from notification, and exclude alarms set off during planned operational work.

- ARB should also include a delay of repair provision to enable operators to reduce emissions by bundling work.
- ARB should continue working closely with the CPUC to coordinate clear roles and responsibilities for implementation across the Proposed Regulation and the Leak Abatement rulemaking.
- Additional suggestions for clarifications to the regulation.

## **I. General Comments on Draft Changes**

### **1. Enforcement**

#### *a. Enforcement Criteria Should Not be Based on Concentration Measurements*

The Proposed Regulation includes criteria specifying the number or percentage of allowable leaks based on concentration thresholds.<sup>1</sup> Starting in 2020, any leak detected with a concentration measurement of 50,000 parts per million volume (ppmv) or greater constitutes a violation of the regulation. PG&E appreciates the proposed changes which modify this provision so that only leaks exceeding the thresholds discovered during an ARB Executive Officer inspection or during the 4<sup>th</sup> quarter of the year would be violations. However PG&E remains very concerned with allowable leak thresholds set on a concentration basis, and believes that applying this threshold may trigger numerous violations for small-emission leaks in the 4<sup>th</sup> quarter of each year, as outlined in more detail below.

As PG&E has pointed out in prior comments, high concentration measurement does not always correlate to a high-emission leak and there is a strong likelihood that low-emission but high-concentration leaks could trigger violations.<sup>2</sup> The Proposed Regulation requires operators to use Method 21 to measure concentrations of methane. However, the Method 21 concentration measurement is not a good predictor of the actual amount of methane being released to the atmosphere. Due to the limited flow rate of Method 21 instruments, the portion of methane from the leak that is sampled varies greatly depending on leak dispersion. Leak dispersion is influenced by many factors, such as: component type, pressure, wind speed, position and orientation of the instrument nozzle, etc. As a result, for the same value of measured concentration, the actual flow rate of the leak can vary greatly.

The report recently released by ARB from Sage Environmental Consulting supports this point and demonstrates that the correlation between concentration and flow-rate measurements is not strong: the correlation coefficient varies widely across the different categories of natural gas equipment that were tested, as can be seen in Figure 1 below.<sup>3</sup> The spread of data around the line of best fit means that at a concentration of 50,000 ppm the measured flow rate can vary from

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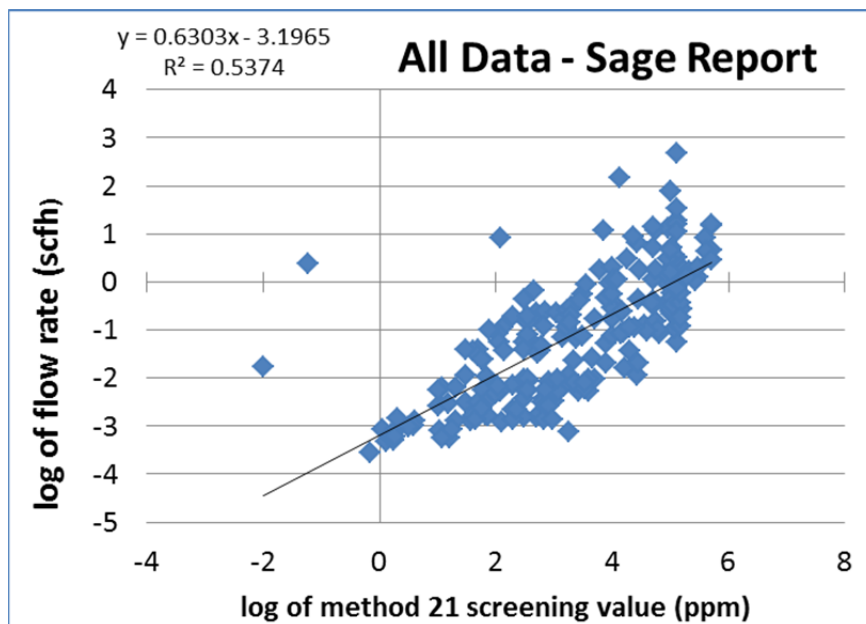
<sup>1</sup> § 95669 (i)

<sup>2</sup> Pacific Gas and Electric Company, "Re: Comments on the Proposed Regulation for Greenhouse Gas Emissions Standards for Crude Oil and Natural Gas Facilities," July 21, 2016.

<sup>3</sup> "Enhanced Inspection & Maintenance for GHG and VOCs at Upstream Facilities," SAGE Environmental Consulting, December 2016, p. 2-12

0.01 standard cubic feet per hour (scfh) to more than 100 scfh (i.e. a range of 10,000). In addition, the comparison of concentration to flow-rate measurements in the Sage report is done on a  $\log_{10}$ -  $\log_{10}$  scale which gives the impression that errors in the estimated flow rate are diminished, even though the error could be larger than the actual value of the flow rate. This further weakens the confidence in the correlation relationship.

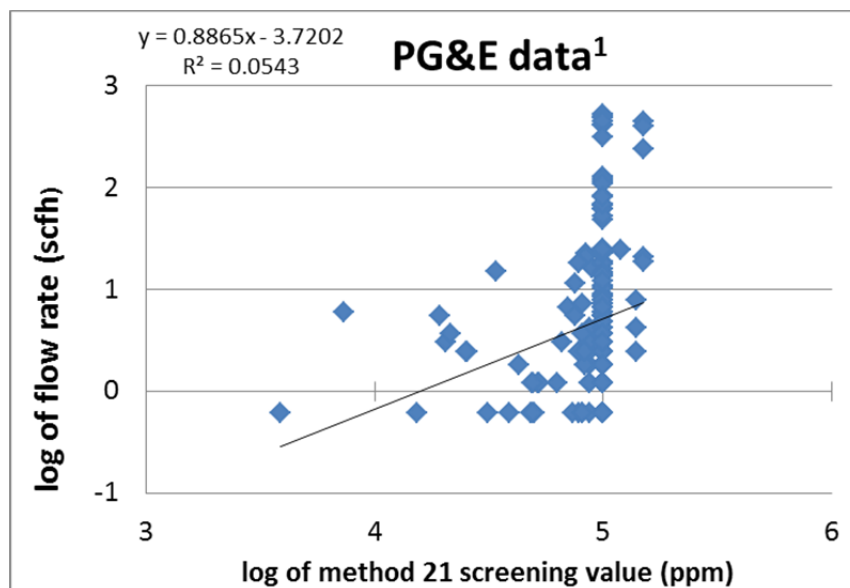
**Figure 1**



PG&E's results from recent leak surveys conducted in 2016 at its compressor stations and underground storage facilities with both concentration and flow-rate measurements similarly demonstrate a weak correlation relationship. As can be seen in Figure 2 below, there is a wide vertical spread of flow-rate measurements for a given concentration.

F-14-1  
cont.

**Figure 2**



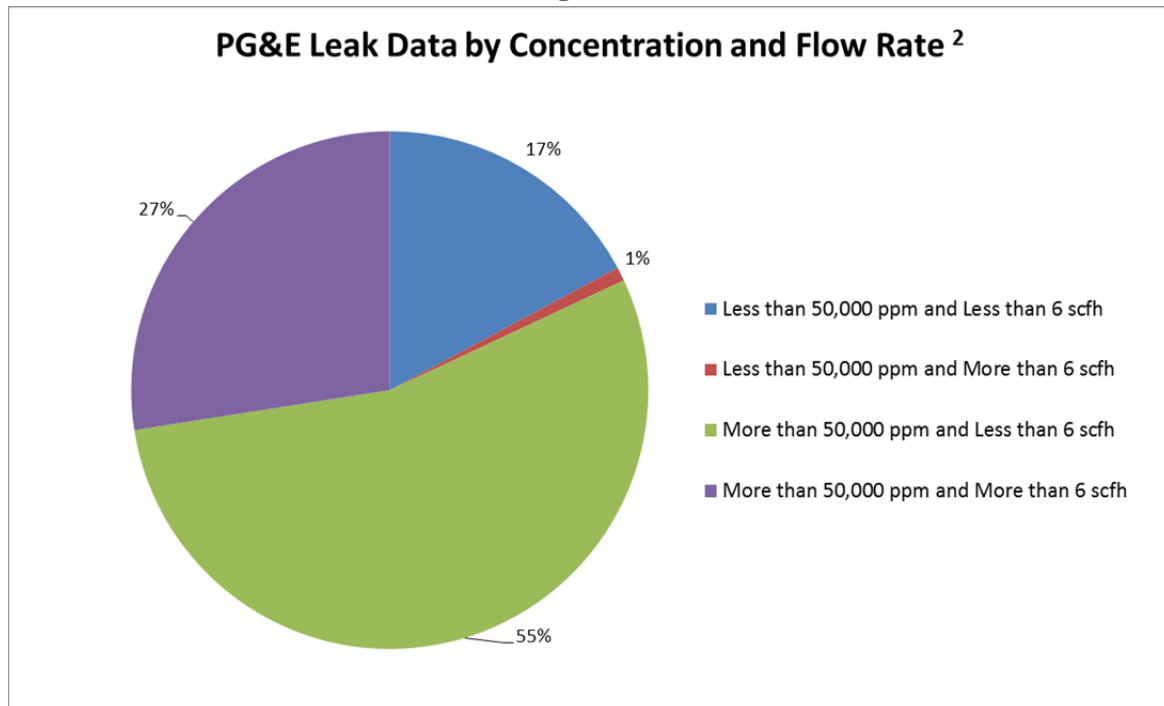
<sup>1</sup> Leak measurements with no detectable flow were excluded.

The relationship between concentration and flow is important because it is the basis on which the Proposed Regulation determines the severity of a leak for notification, repair and enforcement action. In Figure 3, PG&E's leak survey data is displayed to show the percentage of leaks above and below 50,000 ppm concentration with a flow rate above and below 6 cubic feet per hour (the threshold used by ARB in the Proposed Regulation to determine if a pneumatic device is considered "high-bleed" or a large emitter).<sup>4</sup> Fifty-five percent of the leaks found were measured at a concentration above 50,000 ppm but with a flow rate less than 6 scfh, and a small number of leaks were found that measured below 50,000 ppm with greater than 6 scfh flow rate. Using Method 21 concentration measurements alone would incorrectly prioritize those leaks as being high-emission leaks when they are not, or vice versa, incorrectly identify them as being low-emission leaks when they are high.

<sup>4</sup> For reference, 6 scfh leak flow rate equates to 21.19 metric tons of carbon dioxide equivalent per year (MT CO<sub>2</sub>e/year)



**Figure 3**



<sup>2</sup> This data includes leaks too small to be measured with Hi-flow sampler instrument.

As demonstrated above, Method 21 is not a good predictor of actual methane emissions. Therefore PG&E proposes ARB work with it and other stakeholders to better quantify emissions, and use data from more than just Method 21 concentration measurements at each of the regulated facilities to inform a meaningful threshold on the allowable number of leaks. PG&E recommends waiting until 2022 to implement a leak threshold subject to enforcement based on this data. This will allow operators two years once the regulation is implemented to gather sufficient data on the number of leaks and trends on their systems for various types of equipment and components that ARB and stakeholders can then use to set realistic benchmarks against which to require future improvement. The rulemaking process to modify this regulation to set new leak threshold criteria could take up to an additional year, which is the basis for the three-year delay in enforcement of leak thresholds that PG&E recommends above.

*b. Inaccurate Information*

As currently proposed, Section 95674(f) would trigger a violation for submission of inaccurate information required by the regulation. This does not take into consideration “intent” – an operator may unknowingly provide inaccurate information due to instrumentation error for example, or a measurement of a leak may have different results on one date versus another. This provision should be modified to clarify that an operator must “knowingly” submit inaccurate information for there to be a violation, or the provision should be removed since Section 95674(g) already covers falsification of information.

F-14-1  
cont.

F-14-2

## 2. Natural Gas Underground Storage Facility Monitoring

PG&E appreciates the revisions ARB has made to the Proposed Regulation to incorporate greater flexibility for operators to specify how they will meet the requirements of the regulation through their air monitoring plans. The same flexibility should be applied to equipment specifications. The proposed modifications increase the accuracy requirements for ambient air monitors from 100 parts per billion (ppb) to 250 ppb. However, the ambient concentrations of methane and the variations in those concentrations that PG&E has measured at its facilities are in parts per million (ppm). Requiring accuracy levels three orders of magnitude greater than the current range of background concentrations is unnecessary and could cause continuous indications or “false positives” that would take time and resources to continually clear, as well as requiring unnecessary notifications. It would not improve detection of changes in ambient air methane levels that would require an emergency or urgent response to potentially hazardous leaks. In addition, equipment at the ppb range of sensitivity is not widely available and it is unclear if such instruments would work at storage fields in this context. Therefore, PG&E recommends removing the 250 ppb accuracy requirement for monitoring sensors and allowing ARB to approve equipment proposals within the monitoring plans.

F-14-3

In addition, PG&E recommends explicitly including delay of repair provisions for equipment orders for the ambient air monitoring equipment. A provision similar to the one added to section § 95669(h)(4)(A) would be appropriate. Many of the vendors for ambient air monitoring equipment are located out of state and could take longer to ship replacement pieces than the required repair timelines. It should also be noted that this technology has only recently been made commercially available, and therefore provisions that allow for additional time for troubleshooting potential errors with new technology should also be included, if an operator or owner provides documentation showing the ongoing issue is pending resolution with the equipment vendor.

F-14-4

## 3. Notification and Reporting Requirements

As currently written, the Proposed Regulation requires operators to notify ARB, the Division of Oil, Gas and Geothermal Resources (DOGGR), and the local air district any time a leak is identified at an underground storage facility that exceeds the concentration-based leak thresholds. PG&E’s concerns about the use of concentration-based measurement are highlighted above in Section 1. This provision will likely lead to excessive notifications for small leaks with high concentrations, which is counter to PG&E’s interpretation of the intended purpose of this provision, i.e. notifications for large, potentially hazardous leaks. Using this concentration data to notify regulators and agencies may incorrectly burden these agencies, and inappropriately prioritize repairs on low-emission leaks. PG&E recommends allowing an operator to verify the severity of a leak with a flow-measurement threshold before requiring notification. Additionally, leaks that are confirmed as only wellhead-component leaks should be excluded from the

F-14-5

notification requirements as they would not fall under the classification of large, potentially hazardous leaks, which is the intended target of the regulation.

F-14-5  
cont.

PG&E also recommends including language that exempts operators from the notification requirements if an alarm from the ambient air sensors or automated wellhead assembly sensors goes off during a planned operational activity at an underground storage facility. Many of PG&E's storage wells are located within 25 feet of each other and various well remediation operations result in some releases of emissions which would then require notification.

F-14-6

#### **4. Delay of Repair Provisions**

PG&E believes that effective regulations provide sufficient flexibility for operators to continue operations while following the intent of the regulation, and thus appreciates the addition of provisions allowing for the delay of leak repair under certain conditions. These provisions will be critical in facilitating the continued operation of systems while still meeting the intent of the Proposed Regulation.

F-14-7

In addition to allowing a delay of repair for equipment orders and systems critical for reliability, ARB should also allow delay of repair to reduce emissions by bundling work. Without such a provision, there will be situations in which the amount of gas that will have to be released (blown down) to repair a leak will be greater than the emissions from the leak itself. Allowing these leaks to be bundled with other work reduces the overall vented emissions. This would also be consistent with proposed best practices from the California Public Utilities Commission (CPUC) in its Leak Abatement Order Instituting Rulemaking (R.15-01-008) to bundle work whenever possible to prevent multiple ventings of the same piping.<sup>5</sup>

F-14-8

#### **5. Coordination with the CPUC's Leak Abatement Rulemaking**

PG&E appreciates the ARB's participation and continued focus on emission reduction efforts, as well as ensuring consistency between its regulations and the CPUC's Leak Abatement OIR Proceeding (R.15-01-008), as directed by Senate Bill 1371. The Proposed Regulation and the Leak Abatement OIR regulations currently both cover natural gas underground storage and gas transmission compressor stations. Clarification is still needed on which agency owns implementation and reporting when there is overlap. PG&E recommends that ARB take this need for coordination into account as it works to finalize the Proposed Regulation in order to ensure that the jurisdictional boundaries of the ARB and CPUC regulations are clear.

F-14-9

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<sup>5</sup> See Administrative Law Judge's Ruling Entering California Air Resources Board and California Public Utilities Commission Joint Staff Annual Report on Analysis of June 17, 2016 Utilities' Reports and Commission Staff Proposal on Best Practices Into the Record and Seeking Comments, issued in R.15-01-008 on January 19, 2017, at Attachment 2, Best Practice (BP) 7 ("Bundling Work Policy. Written company policy requiring bundling of work, whenever practicable, to prevent multiple venting of the same piping consistent with safe operations and considering alternative potential sources of supply to reliably serve customers. Company policy shall define situations where work bundling is not practicable. Exact wording TBD by the company and approved by the CPUC, in consultation with CARB, as part of the Compliance Plan filing. A company may request an exemption with appropriate justification.")

## 6. Additional Feedback

PG&E has also suggested areas for additional clarification as follows:

- Section 95668 (a)(2)(H) Separator and Tank Systems: include “pipeline liquids” as there may be non-petroleum based products that could be subject to the exemption.
  - Suggested language: “Tanks that recover an average of less than 10 gallons per day of any petroleum or pipeline liquid waste product from equipment provided that the owner or operator maintains, and can make available at the request of the ARB Executive Officer, a record of the amount of liquid recovered. The average daily production shall be determined by using annual production and dividing by 365 days.”
- Sections 95668 (h)(5)(A)(4) and 95668 (h)(5)(B)(2), Natural Gas Underground Storage Facility Monitoring Requirements: Clarify the different requirements for unmanned vs. continuously manned facilities.
  - Suggested language: “The monitoring system for unmanned facilities must have an integrated alarm system that is audible and visible continuously in the control room at the facility and in remote control centers. The monitoring system for continuously manned facilities must have an integrated alarm system that is audible and visible continuously in the control room at that facility.”
- Section 95669 (i)(4) Leak Detection and Repair: Add “planned” to the provision.
  - Suggested language: “Critical components or critical process units shall be successfully repaired by the end of the next planned process shutdown or within 12 months from the date of initial leak detection, whichever is sooner.”

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F-14-11

F-14-12

## II. Conclusion

Thank you for the opportunity to provide feedback on ARB’s draft changes to the Proposed Regulation. PG&E looks forward to participating in continued discussions with ARB in the rulemaking process.

Sincerely,

/s/

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